3 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Chapter 3 describes the existing natural and human environment that would potentially be affected by the Stibnite Gold Project (SGP). The natural and human environment is further divided into resources or resource uses - physical environment, biological resources, and social resources/environment. Each resource section includes a brief description of the geographic area potentially affected for a given resource (analysis area) and, as needed, includes the history, development, past disturbances, natural events, and interactions that have helped shape the current conditions (Affected Environment). Each resource section is organized as follows: a brief introduction and scope of analysis including a definition of the analysis area specific to the resource; relevant laws, policies, and plans regulating the resource; and existing conditions of the resource in the analysis area.

3.1.1 Scope of Analysis

For the purposes of this SGP Environmental Impact Statement, the term “SGP area” is defined to mean the entire area in which disturbance from the SGP components (i.e., the combined disturbance footprints of the mine site, access roads, utilities, and offsite facilities) for any alternatives would occur.

The SGP area is located in Valley County, Idaho, and the mine site is located in the upper East Fork South Fork Salmon River drainage. The mine site is approximately 44 air miles northeast of the City of Cascade and 10 air miles southeast of the community of Yellow Pine (**Figure 1.2-1**). Within the SGP area, which includes offsite infrastructure, under Alternative 1 approximately 2,566 acres are under United States Forest Service (Forest Service) jurisdiction (1,645 acres on Payette National Forest-administered lands and 921 acres on Boise National Forest-administered lands), 880 acres are private lands including lands managed by Midas Gold Idaho, Inc., 25 acres are administered by the Bureau of Reclamation, and 62 acres are administered by the State of Idaho. The mine life, including construction, operation, closure and reclamation, ranges between 20 to 25 years (depending on the alternative) not including additional years for monitoring.

The mine site is within terrain consisting of narrow valleys surrounded by steep mountains. Elevations along valley floors range from 6,000 to 6,600 feet above mean sea level. The surrounding mountains reach elevations over 8,500 feet above mean sea level. The main drainage basin at the mine site is the East Fork South Fork Salmon River. More detailed descriptions of the physical, biological, and social environments are included in the resource sections in the rest of this chapter.

Each resource section begins by identifying the spatial area of analysis (analysis area). The analysis area varies by resource or resource use, depending on the geographic extent of the resource or use and the extent of the potential effects of the SGP. In some cases, the analysis area is the SGP area and other cases, the analysis area may be larger or smaller than the SGP area, encompassing administrative or natural boundaries, because the potential effects on the resource can either extend beyond the SGP area boundary or may only occur in a smaller area such as the mine site.

3.1.2 Relevant Laws, Regulations, Policies, and Plans

Each resource section briefly summarizes applicable laws, regulations, policies and plans that pertain specifically to the resource being described and why each is relevant to the resource.

The 2003 Payette National Forest Land and Resource Management Plan, and the 2010 Boise National Forest Land and Resource Management Plan are the Forest Service plans that provide guidance on National Forest System lands in the SGP area. The forest plans have both forest-wide management directions and more specific management area level directions such as Management Prescription Categories. These management areas are organized around a combination of watershed and administrative boundaries and are designed to tier to the forest-wide direction to help achieve forest-wide goals and desired conditions. A table of standards from both the Payette and Boise National Forest Land and Resource Management Plans that have the potential for a forest plan amendment is included in **Appendix A**.

3.1.3 Existing Conditions

The existing conditions section for each resource describes the potentially affected resources (i.e., physical, biological, social and economic resources or resource uses) qualitatively and/or quantitatively, depending on the analysis requirements identified by the issues and indicators. Most existing conditions descriptions are divided into subcategories based on the main alternatives' components described in Chapter 2 (mine site, access roads, utilities, and offsite facilities).

3.2 Geologic Resources and Geotechnical Hazards

3.2.1 Introduction and Scope of Analysis

This section describes the geologic resources and geotechnical hazards at and in the vicinity of the Stibnite Gold Project (SGP) area. The analysis area for geologic resources includes the footprint of disturbance of all SGP components. Geologic resources as they pertain to this Environmental Impact Statement (EIS) include bedrock (e.g., ore bodies and development rock) and overburden (e.g., glacially derived sediments, alluvium). Regional geology and seismicity are discussed to provide context to the site-specific features. For purposes of this EIS, the description of existing geotechnical hazards include existing or potential mass wasting features (e.g., landslide, rockfall, avalanche paths) and focuses on the mine site, access road areas, and the areas where the transmission lines are proposed to be upgraded and/or new transmission line would be built. In the context of the mine site, geotechnical hazards are described and considered with a focus on three proposed component locations: open pits, the tailings storage facility (TSF), and development rock storage facilities (DRSFs).

3.2.2 Relevant Laws, Regulations, Policies, and Plans

Several laws and implementing regulations apply to mining of the SGP area. The following subsections describe additional laws, regulations, policies, and plans at the federal, state, or local level pertaining to geological resources and geotechnical hazards.

3.2.2.1 1872 Mining Law

The statutory right to search for, develop, and extract mineral deposits on public-domain lands open to mineral entry was established by the General Mining Act of 1872 (1872 Mining Law) and later legislation. These rights include the right to initially locate a mining claim and the right to reasonable access to the claim for further exploration, mining, or necessary ancillary activities, consistent with the Mining and Mineral Policy Act of 1970 (30 United States Code 21a) and other applicable laws. As described elsewhere in this EIS, regulations at 36 Code of Federal Regulations (CFR) 228, subpart A apply to U.S. Forest Service (Forest Service) regulation of surface use of National Forest System lands for locatable mineral operations.

3.2.2.2 Paleontological Resources Preservation Act of 2009

Paleontological resources are managed and protected under the federal Paleontological Resources Preservation Act of 2009 (Public Law 111-11, Subtitle D). The Paleontological Resources Preservation Act defines paleontological resources (with certain exceptions) as “any fossilized remains, traces, or imprints of organisms, preserved in or on the earth’s crust that are of paleontological interest and that provide information about the history of life on earth...” (16 United States Code 470aaa(4)). The Paleontological Resources Preservation Act and implementing regulations (36 CFR 291) include provisions relating to the management, collection, and curation of paleontological resources.

3.2.2.3 Cave Resources Protection Act of 1988

Caves and karst formations are protected and managed by the 1988 Federal Cave Resources Protection Act (Public Law 100-691).

3.2.2.4 Mine Safety and Health Act of 1977

The Mine Safety and Health Act of 1977, as amended (30 United States Code 80,1 et seq.) regulates mine impoundments, retention dams, and tailings ponds, and all are included in the definition of a “coal or other mine” in Section 3(h)(1) of the Mine Safety and Health Act of 1977. All impoundments and dams at metal and nonmetal mines are inspected by the Mine Safety and Health Administration (MSHA) for hazardous conditions. 30 CFR 56.20010 and 57.20010 state the following:

If failure of a water or silt retaining dam will create a hazard, it shall be of substantial construction and inspected at regular intervals.

Under MSHA, potential injuries or fatalities and property damage resulting from a dam failure may constitute a hazard. In addition, flooding resulting from dam failure that could block routes of escape could constitute a hazard.

The MSHA safety standards and regulations for surface metal and nonmetal mines pertaining to retaining dams are in 30 CFR 56, Subpart S. The safety and health standards for underground metal and nonmetal mines pertaining to retaining dams are in 30 CFR 57, Subpart S.

MSHA standards and regulations would specifically apply to most of the components of the SGP with exceptions (e.g., transmission line, Burntlog Road access route).

3.2.2.5 Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) has developed the National Dam Safety Program (NDSP), which includes standards that are applicable to structures constructed on federal land, including tailings storage facility embankments (i.e., dams). The NDSP provides a conceptual framework that includes requirements for site investigation and design, construction oversight, operations and maintenance, and emergency planning.

The NDSP is a partnership of states, federal agencies (including Forest Service), and other stakeholders to encourage and promote the establishment and maintenance of effective federal and state dam safety programs to reduce the risk to human life, property, and the environment from dam-related hazards. The NDSP includes federal guidelines for the following topics:

- Dam Safety Risk Management – FEMA P-1025 (FEMA 2015)
- Emergency Action Planning for Dams – FEMA 64 (FEMA 2013a)

- Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures – FEMA P-946 (FEMA 2013b)
- Selecting and Accommodating Inflow Design Floods – FEMA P-94 (FEMA 2013c)
- Earthquake Analysis and Design of Dams – FEMA 65 (FEMA 2005)
- Dam Safety – FEMA 93 (FEMA 2004).

3.2.2.6 U.S. Forest Service

3.2.2.6.1 Tailings and Mine Waste

Regulatory jurisdiction over a tailings embankment and tailings storage facilities depends largely on the location. Tailings facilities located fully or in part on federal land administered by the Forest Service are analyzed and approved as part of the review process for the mining plan of operations, and a bond is required for any reclamation requirements associated with a tailings embankment and storage facility.

Mineral regulations specifically give the Forest Service the ability to regulate tailings: "All tailings, dumpage, deleterious materials, or substances and other waste produced by operations shall be deployed, arranged, disposed of or treated as to minimize adverse impact upon the environment and forest surface resources" (36 CFR 228.8(c)).

The Forest Service would require that the tailings storage facility adhere to NDSP guidelines.

3.2.2.6.2 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for geologic resources and geotechnical hazards and include various objectives, guidelines, and standards for this purpose.

3.2.2.7 Idaho Code

Surface mining is regulated by the Idaho Department of Lands through the Mined Land Reclamation Act, codified as Idaho Code Title 47, Chapter 15. The Idaho Department of Lands regulatory oversight includes mining and other activities on private and patented land, as well as on public lands under federal ownership and/or surface management. Idaho Department of Lands also is responsible for coordinating efforts between other state agencies for mining projects. The Mine Land Reclamation Act requires reclamation of affected land to return them to a productive condition. Idaho dam safety statutes are enumerated in Section 42-1709 through Section 42-1721 of the Idaho Code. Mine tailings impoundment structures greater than or equal to 30 feet high are regulated by the Idaho Department of Water Resources in the same manner as water storage projects, with an additional provision that a surety bond be secured by the owner, payable to Idaho Department of Water Resources to ensure the TSF is placed in a safe and maintenance-free condition upon decommissioning.

3.2.2.8 Idaho Administrative Procedure Act and Regulations

Rules governing mined land reclamation are described in Section 20.03.02 of the Idaho Administrative Procedure Act regulations. Design and construction requirements for Mine Tailings Impoundment Structures are described in the Idaho Administrative Procedure Act Section 37.03.05, while Section 37.03.06 describes rules for the safety of dams.

The Idaho Administrative Procedure Act 58 Current Administrative Rules (58.01.13) address ore processing by cyanidation and would apply because these rules are relevant to tailings dams, pipeline, and process ponds if they contain cyanide process water.

3.2.2.9 Valley County Regulations

No specific Valley County regulations exist regarding geotechnical issues at mines or geological resources and hazards. However, Valley County has pertinent sections in their ordinances that relates to flood control and land use that may apply to the SGP.

3.2.3 Existing Conditions

3.2.3.1 Geologic Setting

The geological resources analysis area is within the Salmon River Mountains, a high-relief mountainous physiographic province in central Idaho. The proposed mine site has undergone extensive ground disturbing activities associated with past mineral development spanning more than a century (i.e., legacy mining features).

3.2.3.1.1 BEDROCK GEOLOGY, LITHOLOGY, AND STRATIGRAPHY

Several studies have described the lithologic characteristics and stratigraphy of the intrusive, metasedimentary, volcanic, and unconsolidated rocks exposed in the analysis area, such as Larsen and Livingston (1920), Schrader and Ross (1925), Currier (1935), White (1940), Cooper (1951), Smitherman (1985) Stewart (et al. 2016), and Gillerman (et al. 2019). The descriptions that follow are derived from these and other relevant sources as well as from unpublished studies by past operators, Midas Gold Idaho, Inc. (Midas Gold) and Midas Gold contractors and consultants. A regional geologic map of the area is provided in **Figure 3.2-1**, and a general map of local geology at the proposed mine site is provided in **Figure 3.2-2**.

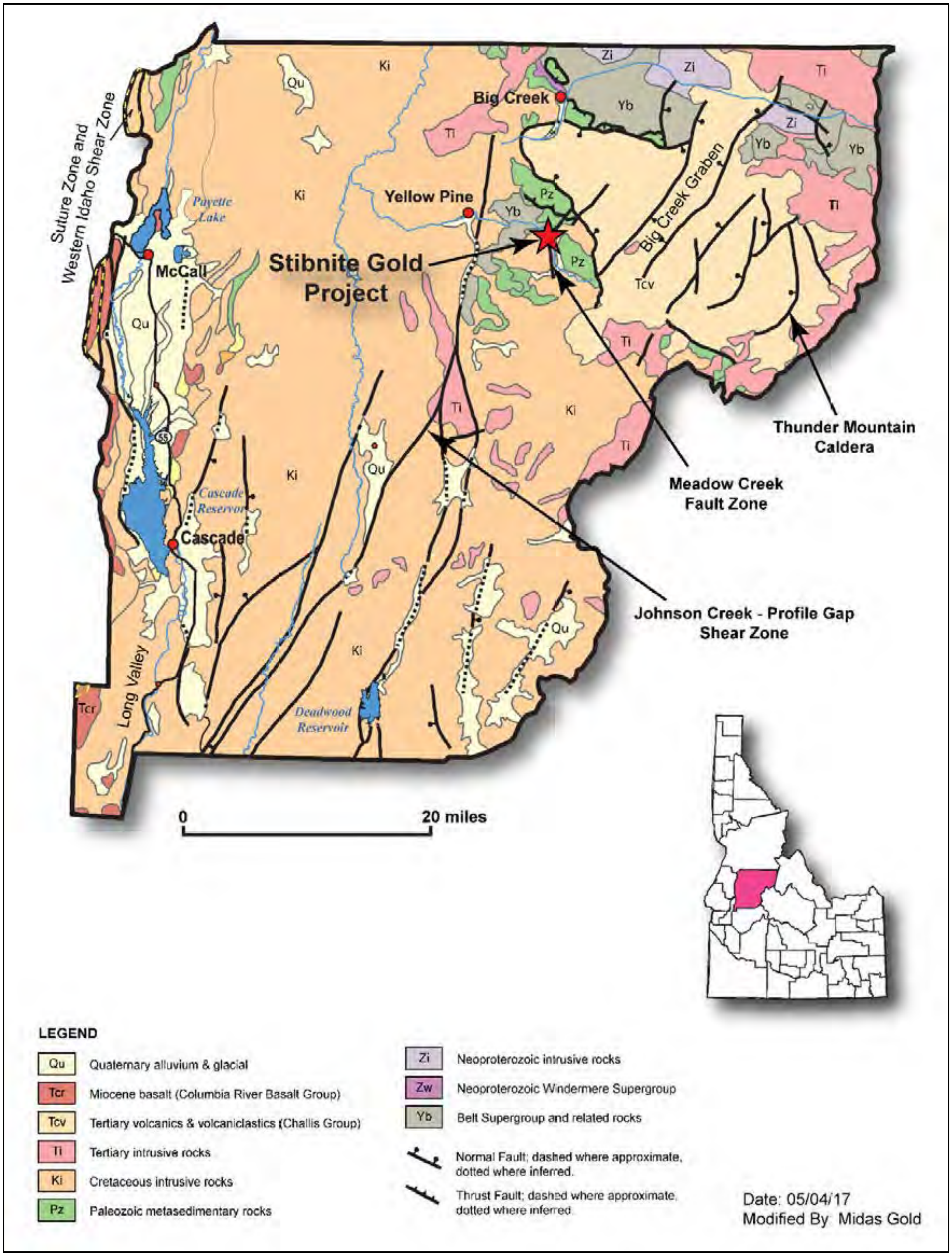

Figure Source: Digital Atlas of Idaho 2017, modified by Midas Gold

Figure 3.2-1 Valley County Regional Geologic Map

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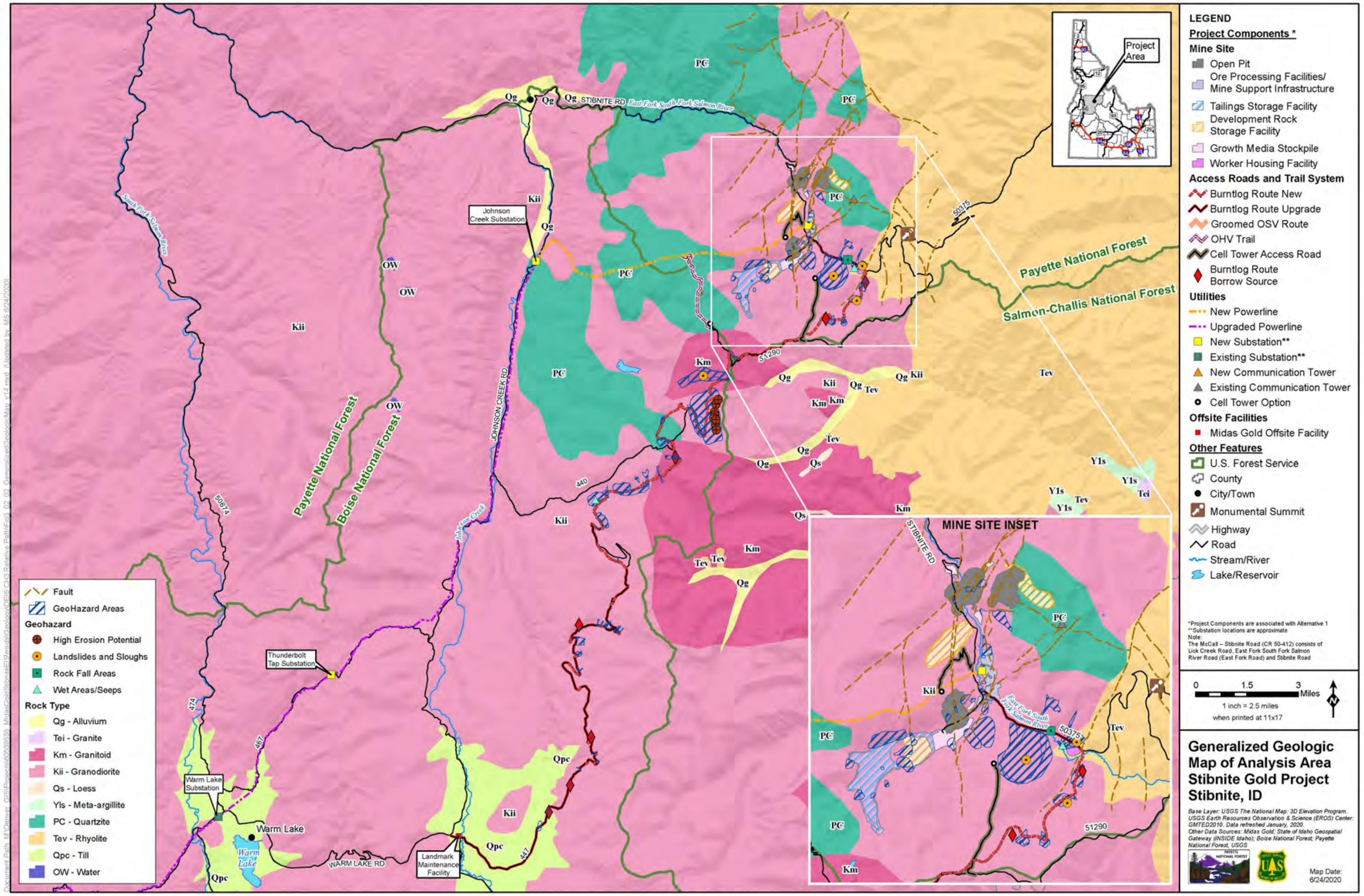

Figure Source: USGS 2007

Figure Notes:

Figure 3.2-2 provides an overview of general geologic features and rock types in the vicinity of the SGP based on 2007 data available from the USGS. Nomenclature and classification of the rocks in the analysis area has differed over the years by authors. "PC - quartzite" listed on the legend is described in closer detail by others as metasedimentary rock which includes several rock types including quartzite, schist, calcareous schist, and marble. In addition, extent of outlines (contacts) of rock types may differ slightly among references. More detail is provided in Stewart et al. 2016 and Gillerman et al. 2019.

Figure 3.2-2 Generalized Geologic Map of Analysis Area

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Bedrock is the solid rock underlying loose surficial deposits. Bedrock geology in the region can be subdivided into three generalized groups based on age, lithology, and stratigraphic relationships (listed from oldest to youngest):

(a) Pre-Cretaceous Upper Neoproterozoic to Ordovician (>440 million years ago [Ma)]) metasedimentary rocks within the Idaho Batholith. These units are exposed in the West End pit and southeast of the Yellow Pine pit areas and include a succession of folded, faulted, and metamorphosed carbonate and siliciclastic rocks that comprise a portion of the original rock that was later intruded by the Idaho Batholith and remains as a roof pendant[1]. **Figure 3.2-3** presents a typical stratigraphic column of these materials.

(b) Cretaceous (145 to 66 Ma) igneous rocks of the Idaho Batholith. These rocks host the Hangar Flats deposit and parts of the Yellow Pine deposit and underlie much of the rest of the area. The igneous rocks consist primarily of granodiorite and granite with lesser amounts of diorite and aplite. The classification of predominant rock type (granodiorite) is based on the geologic map (description of map units of the Stibnite quadrangle (Stewart et al. 2016). Nomenclature and classification of the rocks that comprise the Idaho Batholith has differed over the years by authors. In this EIS, the term granodiorite is used synonymously with quartz monzonite to describe the primary rock types of the Idaho Batholith. Intrusive rock nomenclature correlations are described in Gillerman et al. (2019, Table 2-2).

(c) Tertiary (65 to 1.6 Ma) intrusive and volcanic rocks.

3.2.3.1.2 SURFICIAL DEPOSITS AND FEATURES

3.2.3.1.2.1 Glacial Deposits and Features

In the analysis area, repeated erosional and depositional processes occurred that were associated with glaciation during the Pleistocene. Colman and Pierce (1986) estimated the last glacial advance in the area was approximately 20,000 years ago. Glaciers created U-shaped valleys with over-steepened, talus-covered sides, and hanging-valley tributaries. U-shaped valleys also have lateral, terminal, and recessional moraines, and glacial outwash deposits at their lower ends.

[1] A roof pendant is a mass of original rock that remains after being intruded by igneous rock and projects downward into the intrusive rock (in this case, the batholith).

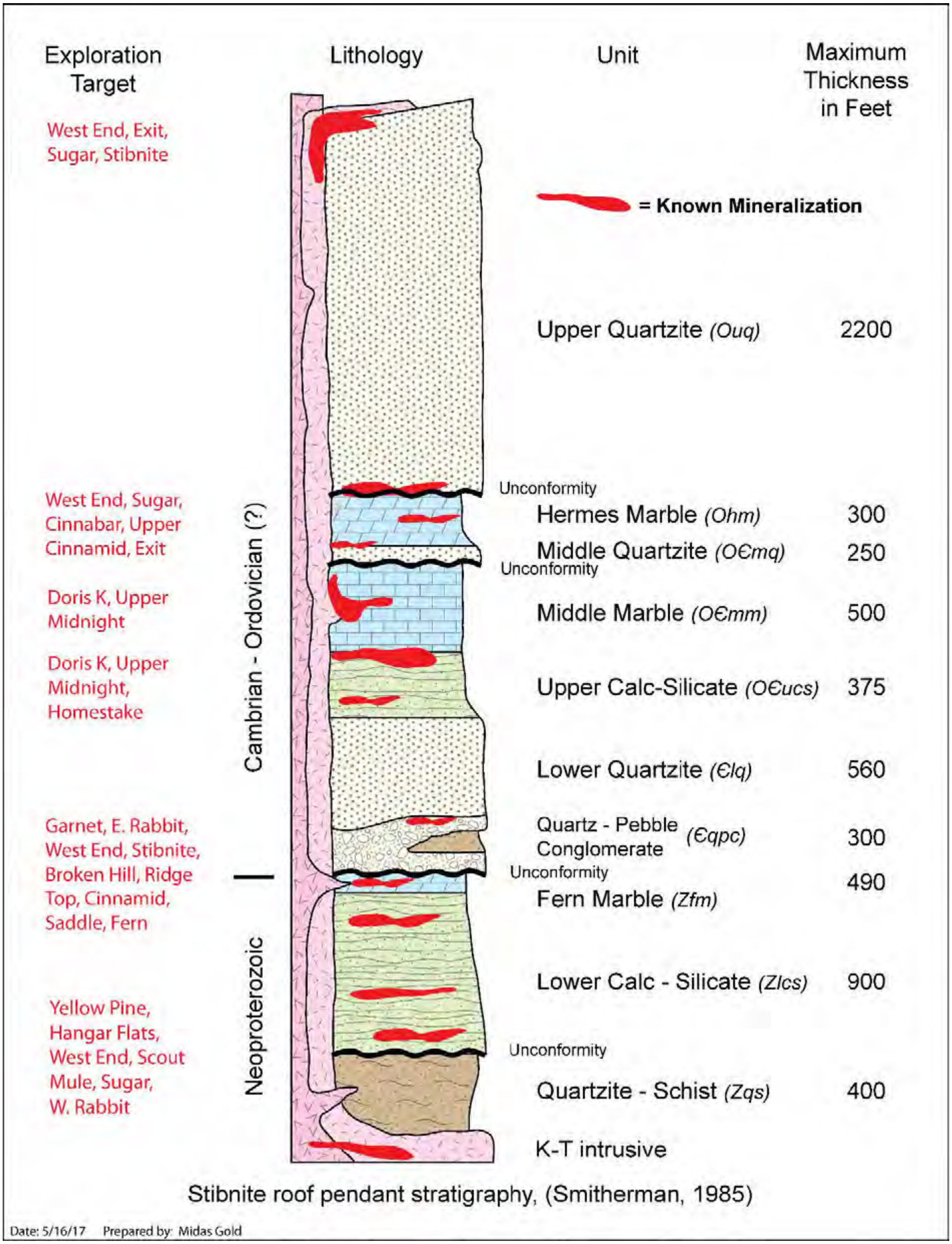

Figure Source: Smitherman 1985 as modified by Midas Gold 2017

Figure 3.2-3 Typical Bedrock Stratigraphy of Stibnite

3.2.3.1.2.2 Alluvial Deposits and Features

Alluvial Processes and Deposits

Because of the steep topography in the analysis area, most of the drainage morphology is dominated as a result of erosional processes. Some of the important features developed from or that relate directly or indirectly to fluvial (stream or river) action in the analysis area are described below. The Stream Functional Assessment (HDR 2016; Rio ASE 2019) provides additional detail regarding current conditions and stream characteristics in the analysis area.

Alluvial Fans and Aprons

Alluvial fans are the result of erosion and deposition of material by a stream or river into an adjacent basin. These deposits tend to be fan-shaped in plan view, radiating away from a point source higher up the drainage or valley. Adjacent fans can merge and form alluvial aprons or slopes and may overlap each other. Several small alluvial fans in the analysis area have formed over the older glacially derived landforms.

A large alluvial fan occurs below the East Fork of Meadow Creek (known as the Blowout Creek fan). The failure of a water reservoir earthen dam in 1965 helped create this fan by depositing large amounts of sand and gravel (Midas Gold 2016, Figure 1). The Blowout Creek fan functions as both a filter of sediment from surface runoff and a source of sediment in runoff, depending on the intensity of precipitation events. Several coalescing fans also occur at the toe of Garnet Creek (east of the ore processing plant area) and the two smaller drainages to the north. These fans can contain and transmit substantial groundwater, but also function as sediment filters for natural surface runoff and feed streamflow downgradient. These alluvial fans have higher water-holding capacity, or porosity, relative to more permeable, well-drained, angular talus fans and slope materials found at higher elevations. The alluvial the fans often have wetlands with distinctive soil, vegetation, and ecological habitat characteristics. Many of these fans can be and often have been the areas of avalanche runout.

Alluvium and Glacial Outwash Deposits

Glacial outwash is glacially derived material that is eroded, reworked by water sourced from glaciers upgradient, and then deposited downstream. Glacial outwash occurs throughout the analysis area and underlies nearly all the larger valley areas. In some cases, other landforms and processes have combined and influenced the route of the glacial outwash channel. Alluvium in the area predominantly consists of glacial outwash deposits. Unlike glacial till (ice transported material), alluvium typically exhibits some bedding and is often moderately sorted. Grain sizes range from clay to boulders, and sub-rounded to well-rounded clasts are typical. Locally, thickness of glacial outwash ranges from 0 to over 200 feet.

Holocene Features

Modern (Holocene, about 12,000 years ago to present) stream drainage patterns indicate high rates of erosion with coarse-grained sedimentary fluvial deposits in floodplains comprised of a mixture of angular clasts from adjacent bedrock sources combined with more rounded reworked glacial meltwater deposits.

3.2.3.1.3 STRUCTURAL GEOLOGY

This section describes the major structural geologic features in the analysis area including Mesozoic folds and Cenozoic faults. Primary references that describe regional geology include Gillerman et al. (2019) and Stewart et al. (2013, 2016).

3.2.3.1.3.1 Folds

Folds are a result of pressure on rock causing the rock to bend or fold rather than break. There are multiple fold features in the vicinity of the analysis area including the Tamarack Antiform about 3 miles north of the Yellow Pine pit area (Stewart et al. 2016). The fold axis trends northwest-southeast, is several miles long, and its geometry is open- to slightly overturned toward the southwest (Stewart et al. 2016). Two large map-scale folds with numerous smaller fold structures are known in the Stibnite roof pendant and were first identified as early as the 1920s (Currier 1935; Larsen and Livingston 1920).

The largest fold in the analysis area is the Garnet Creek Syncline, a 3.5-mile-long, northwest-trending, 1-mile-wide doubly plunging syncline, overturned toward the southwest (Smitherman 1985; Stewart et al. 2016). A second large fold structure occurs northeast of the Garnet Creek Syncline, on the opposite side of the Cinnabar Peak Fault, and has an antiformal geometry and similar scale. The fold has been informally named the Cinnabar Peak Antiform by Midas Gold. The folds in the analysis area are cut by several major district- to regional-scale fault zones that offset the previously folded stratigraphic section. The most pronounced offsets occur along the Fern Fault in the southeast end of the Stibnite roof pendant and along the Meadow Creek Fault in the northwest end of the roof pendant (Stewart et al. 2016).

3.2.3.1.3.2 Faults

A fault is a discontinuity in a volume of rock across which there has been significant displacement as a result of rock-mass movement. Large, north-south striking, steeply dipping to vertical structures occur in the central and eastern portions of the analysis area including: Meadow Creek Fault Zone (MCFZ); West End Fault Zone (WEFZ); Scout Valley Fault Zone; Garnet Creek Fault Zone; Rabbit Creek Fault Zone; Fern Fault Zone; and Mule Fault Zone. The MCFZ and WEFZ exhibit pronounced fault gouge[2] and multiple stages of brecciation, suggesting multiple periods of movement. Available information indicates faults were active during the late Cretaceous and Paleogene (e.g., Gillerman et al. 2019). These faults zones are

[2] Fault gouge is finely crushed and ground-up rock produced by the friction of movement between two sides of a fault.

poorly exposed, exhibit recessive weathering[3], and some occur under or along the flanks of glacially carved valleys.

Regional studies of area fault systems indicate there is a low likelihood of active faults in the analysis area (URS Corporation [URS] 2013). Field observations have not identified evidence of active faults. Shallow slope failures are more likely due to results of stream incision and associated normal rates of mass wasting and slope erosion. Whereas, local faults are evidently inactive, ground shaking at the mine site caused by earthquakes is possible (URS 2013). The March 2020 Challis, Idaho earthquake with magnitude (M)[4] 6.5 and aftershocks occurred southeast of the mine site, about 45 miles west of Challis, Idaho, outside the analysis area.

3.2.3.1.4 MINERALIZATION

Mineralization began in the late Cretaceous. Hydrothermal alteration is associated with igneous intrusive rocks of the Idaho Batholith and surrounding metasedimentary rocks. In the Eocene (56 to 34 Ma) normal block faulting and dike swarms occurred. Hydrothermal alteration and mineralization continued during this later tectonic event. Gold mineralization and associated alteration spanned both the Cretaceous and Eocene events (Midas Gold 2017). Metals mineralization typically occurs in association with very fine-grained disseminated pyrite and, to a lesser extent, arsenopyrite, with gold almost exclusively in solid solution in these minerals (M3 Engineering and Technology 2019). Antimony mineralization occurs primarily as the sulfide mineral stibnite. Zones of silver-rich mineralization locally occur with antimony and are related to the presence of pyrargyrite, hessite, and acanthite (Huss et al. 2014). Regional mapping by the Idaho Geological Survey (Stewart et al. 2013) outlines a previously unrecognized, major, northeast-trending graben complex trending through and just to the southeast of the area (**Figure 3.2-2**, Big Creek Graben). This feature is likely a fundamental structural control on at least some of the mineralization in the district.

3.2.3.1.4.1 Intrusive Rocks

The alteration that occurred as a result of batholitic intrusion in the Yellow Pine and Hangar Flats deposits is described by White (1940) and Lewis (1984). Gold-bearing mineralization originally occurred as part of multiple phases of hydrothermal replacement. A subsequent high temperature sulfide mineralization phase initially contained little gold but as temperatures decreased, gold-bearing mineralization increased (Midas Gold 2017).

The carbonate-dominated mineralization is distinguished by dolomite, calcite, and quartz with mainly potassic alteration. Sericite has precipitated in small cavities and along fractures and as fissure-filling veinlets with pyrite and arsenopyrite. Coarse-grained stibnite veins are commonly

[3] Recessive weathering means the surrounding rock (in this case the rock on either side of a fault) is more resistant to weathering than the fault gouge material.

[4] Magnitude is a number that characterizes the relative size of an earthquake. Magnitude is based on measurement of the maximum motion recorded by a seismograph. Several scales have been defined, but all magnitude scales should yield approximately the same value for any given earthquake (USGS 2020a).

associated with a later stage of mineralization (Gillerman et al. 2019). Tungsten, as the mineral scheelite, occurs as veins and in breccias often intergrown with stibnite, although in many cases scheelite has been observed cemented by or crosscut by stibnite, suggesting stibnite mineralization occurred during, but continued after, scheelite deposition (Midas Gold 2017). Stibnite veining and replacement-style mineralization is often associated with calcite and ankerite (with possible iron, manganese, magnesium) carbonate (Gillerman et al. 2019).

3.2.3.1.4.2 Metasedimentary Rocks

Gillerman et al. (2019) describes the economic mineralization sequence in the Stibnite district which occurred in two main stages. The main (early) stage mineralization and alteration of metasedimentary rocks described in the study includes formation of secondary silica and sulfide mineralization as veins and disseminations (arsenic-rich and locally gold-rich with arsenopyrite). Higher-temperature quartz veins were later cut by veins with distinctive lower-temperature assemblages including stibnite mineralization. In the West End deposit, gold concentrations occur within the later fracture-controlled mineralization with breccia zones in the metasedimentary rocks (Gillerman et al. 2019).

3.2.3.2 Mineral Reserves

The amended Preliminary Feasibility Study prepared for Midas Gold for the SGP reports an estimated Probable Mineral Reserve[5] of 4.5 million ounces of gold, 6.9 million ounces of silver, and 137 million pounds of antimony (M3 Engineering and Technology 2019).

3.2.3.2.1 YELLOW PINE DEPOSIT

Mineralization of the Yellow Pine deposit is structurally controlled and localized by the MCFZ and related structures. Mineralization styles, intensity, and widths of alteration vary relative to distance from the change in strike of the MCFZ. Gold and antimony have different geochemical signatures, geometries, and locally occurred in different structures during deposition. Structures and fractures open to circulating hydrothermal fluids during gold deposition were not necessarily open for antimony deposition. The deposit shows some apparent zonation with gold occurring throughout the deposit footprint, but with antimony and tungsten primarily in the central and southern portions of the deposit (Huss et al. 2014).

The dominant fault directions mapped underground and in the open pits by various geologists from Bradley Mining Company (1938 to 1952), White (1940 to 1941), Cooper (1950 to 1951), and Midas Gold (2012) trend north-south, northeast, and east-northeast. However, the controls for antimony mineralization show more northwesterly trends. The different geometries of antimony and gold distribution suggest different controls for mineralization: antimony is more strongly influenced by northwest fracturing and gold is more strongly influenced by northeast and east-northeast structures. White (1940) interpreted all strike-slip faulting as post-mineral; whereas Cooper (1951) suggested there was significant post-mineralization movement between periods of early gold mineralization and later antimony-tungsten mineralization. Midas Gold’s

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[5] Probable Mineral Reserve is the economically mineable part of the measured mineral resource.

current interpretations on the relative timing of gold versus antimony mineralization are like those interpreted by Cooper (1951).

Mineralization at the south end of the Yellow Pine deposit exhibits strong, steeply west- and east-dipping north-south oriented structural controls and occurs in a narrow 80- to 165-foot-wide corridor along the footwall (east side) of the MCFZ. In the central domain of the deposit, numerous structural elements intersect, and mineralization occurs along east to east-northeast striking and west to west-northwest striking, north-dipping dilatant structures, which occur at relatively high angles to the main shear zone. The multiple structural features provided significant pathways to mineralizing hydrothermal solutions and the mineralization (Huss et al. 2014). Historically, 6.48 million tons of ore were mined from this location (Midas Gold 2016). From the mined materials, 479,517 ounces of gold, 1,756,928 ounces of silver, 40,275 tons of antimony, and 13,579,157 pounds of tungsten were extracted.

3.2.3.2.2 HANGAR FLATS DEPOSIT

Mineralization within the Hangar Flats deposit is entirely intrusive-hosted, and structurally controlled and localized by the MCFZ. The MCFZ is generally a north-trending, steeply west-dipping complex fault zone with ancillary structures and can be traced from the main Yellow Pine deposit south, 1.85 miles through the Hangar Flats deposit and continues south for approximately 1.25 miles. Past production and currently defined mineralized zones occur along variably north-plunging tabular to pipe-like bodies at the intersection of the main north-south structural feature and northeast to southwest and east to west trending steeply dipping conjugate structures and northeast trending, shallow northwest dipping (±30°) dilatant splays. The mineralized zones range in thickness from 16 to over 330 feet and can be traced several hundreds of feet down dip. They occur as stacked ellipsoidal lenses along the footwall to the main MCFZ, which is a thick, 80- to 165-foot-wide zone of clay gouge and heavily broken and brecciated ground. At Hangar Flats, the mineralized zones become thinner, less continuous, and lower grade away from the main MCFZ (Huss et al. 2014).

Historically, 303,853 tons of ore were mined from this location, primarily through underground mining (Midas Gold 2016). From the mined materials, 51,610 ounces of gold, 181,863 ounces of silver, 3,758 ounces of antimony, and 1,062 pounds of tungsten were extracted.

3.2.3.2.3 WEST END DEPOSIT

In the West End deposit, gold mineralization occurs preferentially where the northwest-striking, northeast-dipping calc-silicate and schist units are cut by the WEFZ or subsidiary faults, but all rock types host mineralization. Mineralized zones occur as stacked ellipsoidal bodies plunging along the intersection of favorable lithologic units and structural zones. True widths of these bodies range from 50 to over 330 feet. Midas Gold drilling intersected gold mineralization associated with the WEFZ well below the historical pit bottom—as deep as 1,300 feet below the original ground surface where mineralization was exposed prior to mining. The hanging wall of the WEFZ tends to exhibit relatively more dilatant and dispersed structures relative to the footwall and, therefore, more significant mineralization. Open-space fill quartz veins are closely associated with the faults and are indicative of higher-grade zones of mineralization. In addition to sulfide mineralization, open fractures along the WEFZ and subsidiary faults have allowed for oxide formation at depth from meteoric water infiltration (Huss et al. 2014).

Historically 8,156,942 tons of ore were previously mined from this location (Midas Gold 2016). From the mined materials, 454,475 ounces of gold and 149,760 ounces of silver were extracted.

3.2.3.2.4 EXPLORATION PROSPECTS

In addition to the mineralized areas described above, numerous prospects have been discovered during exploration and development activities in the vicinity of the analysis area over the past nearly 100 years. Some of these prospects were developed into mines while others remain undeveloped.

Besides pit expansion possibilities around the main deposits, other exploration targets may one day warrant consideration for development if they can be proved viable after additional exploration, environmental, socioeconomic, metallurgical, engineering, and other appropriate studies. Future proposed mining projects would require analysis and review under the National Environmental Policy Act and be required to comply with other federal and state regulations that apply to mining projects.

3.2.3.3 Legacy Mine Features

Over 90 years of mineral exploration and development has created numerous prospect pits, shafts, and adits (often referred to as “tunnels”) in the analysis area which may represent physical safety hazards. The locations of former underground and open-pit mine workings have been identified using historic maps and files from legacy operators and researchers active during operations. Midas Gold (2016, Appendix D), provides a summary of the history of the Stibnite Mining District. In addition, Midas Gold (2016, Figure 4-2) depicts locations of previous mining and related activities in the vicinity of the mine site.

Many of the workings are no longer visible at the surface (from collapse or closure/reclamation) or have been altered by later mining activities, such as in the Yellow Pine pit area. Areas where larger underground workings were once developed and still exist include the Meadow Creek Mine, Defense Minerals Exploration Administration Tunnel, North Tunnel, Monday Tunnel, Cinnabar Tunnel, Bailey Drain Tunnel, and Clark Tunnel (Midas Gold 2016).

The analysis area contains piles of rock material from past mining or processing activities. These rock pile areas include old development rock piles such as the Bradley East and Bradley West dumps, the Meadow Creek Mine dumps, materials excavated and piled near the outlet to the Bailey Tunnel and Clark Tunnel, and material piles near the Yellow Pine pit lake at Monday Tunnel and along the former open-pit benches in the Yellow Pine pit. Tailings were deposited from the 1920s through 1950s in the Meadow Creek drainage and overlain in some areas by spent ore (e.g., spent ore disposal area [SODA]) in the 1980s and 1990s. Other areas of fill include development rock storage piles at the former Homestake pit, below the current Midas Gold exploration camp and shop areas, in West End Creek, and as backfill in the former West

End and Garnet pits. There also is a loaded former heap leach pad built, operated, and closed by Hecla Mining in the 1990s, and a series of partially unloaded pads to the east.

3.2.3.4 Paleontological Resources

Potential Ordovician (approximately 485 to 444 Ma) invertebrate fossils were reported by Lewis and Lewis (1982), but later workers, examining the same sites and materials, have determined these are assemblages of alumino-silicate (tremolite) and calc-silicate minerals (Lund 2004; Stewart et al. 2016). The high metamorphic grade and extensive recrystallization of the minerals that make up the sedimentary rock units in the area generally precludes preservation of fossils that would be subject to the requirements of the Paleontological Resources Preservation Act.

3.2.3.5 Cave and Karst Resources

There are no known or suspected cave or karst resources in the analysis area. The extensive metamorphism of the carbonate rocks in the area, as well as level of exposure relative to the original ground surface where caves and karst would form, would generally preclude the existence or preservation of such features in the area.

Three unconformities associated with the stratigraphic tops of the district's three carbonate units (Hermes Marble, Middle Marble, and Fern Marble) are extensively recrystallized and dolomitized, and exhibit well developed fracture controlled vugs (i.e., cavities in rock, lined with mineral crystals). However, these units do not contain large voids or cavities anywhere near the size to be considered karsts or caves and are not protected by, or subject to, the Cave Resources Protection Act.

3.2.3.6 Seismicity

3.2.3.6.1 HISTORIC SEISMICITY

The analysis area is along the western boundary of the Centennial Tectonic Belt (CTB), which is centered in southcentral Idaho[6]. Earthquakes with an approximate magnitude of 6 or greater have occurred in the CTB with epicenters east and southeast of the mine site (**Figure 3.2-4**). The CTB is a northwest- to southeast-trending 30- to 60-mile-wide belt of seismicity and late Quaternary faulting extending west from the Yellowstone-Hebgen Lake region. Seismicity in the CTB occurs in multiple geologic provinces (including the Idaho Batholith and northern Basin and Range) and becomes more diffuse westward from the Yellowstone-Hebgen Lake region (URS 2013). The analysis area is within the CTB and has the potential to be subjected to strong (M6 and greater) earthquake ground shaking from seismic activity related to the CTB feature (URS 2013).

[6] URS (2013) describes the Centennial Tectonic Belt (CTB) as the subject seismic region. The term Central Idaho Seismic Zone is interchangeable with CTB in the literature. As the more commonly used term, CTB is used herein for consistency with the URS (2013) source report.

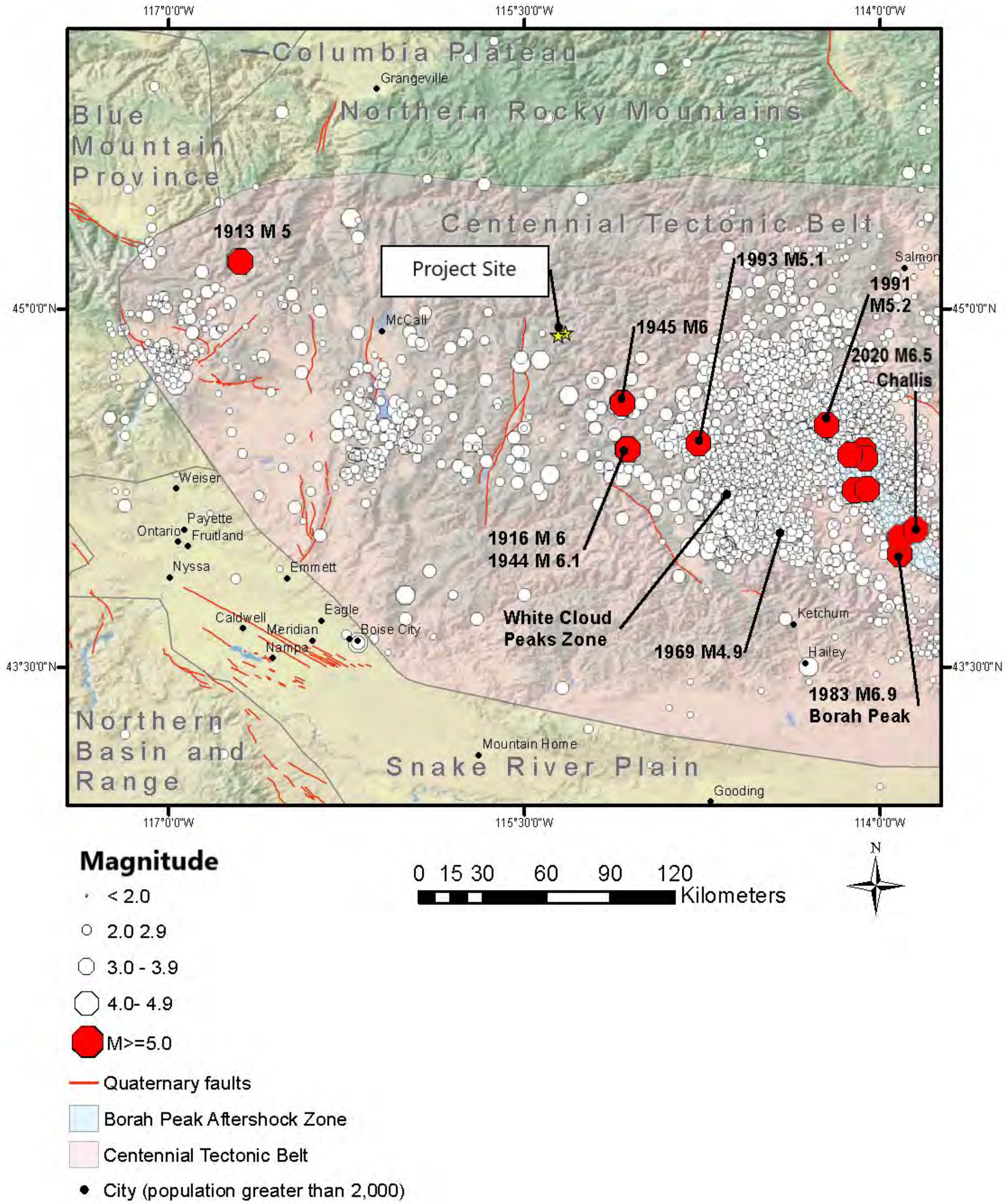

Figure Source: URS 2013; USGS 2020b

Figure 3.2-4 Historic Seismicity (1879-March 2020) of Central Idaho

Several moderate to large earthquakes have occurred in an approximate 60- to 90-mile radius of the analysis area including:

- 1916 Boise Earthquake (M6)
- 1944 and 1945 Seafoam earthquakes (M6.1 and M6.0, respectively)
- 1983 Borah Peak earthquake (M6.9)
- 1993 White Cloud Peaks earthquake swarm (highest single earthquake M5.1)
- 2020 Challis earthquake (M6.5) (USGS 2020b).

These earthquakes occurred near the center of the CTB (approximately 30 miles southeast of the analysis area) (URS 2013; USGS 2020b). Late Quaternary faults in the CTB generally trend northwest-southeast in the east and trend more north-south toward the west. The most significant potential seismic sources near the analysis area include the Cascade, Council, Deadwood-Reeves Creek, Long Valley, and Sawtooth fault zones (URS 2013) (**Figure 3.2-4**).

Although numerous faults are present within the analysis area, none show evidence of recent active movement nor do historic records suggest this has occurred. However, shallow mass slope movements related to weathering and typical slope processes in mountainous terranes (e.g., slumps, debris slides, avalanches) do occur, and activation of these features during a strong seismic-induced ground shaking event is possible (URS 2013).

3.2.3.6.2 Seismic Hazard Analysis

A site-specific seismic hazard analysis was conducted by URS (2013). A seismic hazard analysis describes the natural phenomena such as ground rupture, fault movement, or soil liquefaction that could be caused by an earthquake. The purpose of the analysis is to determine the response of the structure to seismic loading. The results of seismic hazard analysis are used as a basis for design and mitigation measure decisions (FEMA 2006).

The seismic hazard is assessed from instrument measurements as well as historical accounts and geologic observations. Seismic hazard analysis is quantified by three parameters: level of severity, spatial measurement, and temporal measurement (Wang 2009). The seismic hazard was assessed at two proposed sites: ore processing plant and the TSF dam – areas considered to have the highest risk of impacts should a failure occur due to an earthquake. URS performed both probabilistic and deterministic seismic hazards analyses, each type of analysis and their relationship is explained below. The combined results probabilistic seismic hazard analysis (PSHA) and deterministic seismic hazard analysis (DSHA) are an effective means for determining maximum design earthquake[7] ground motions (FEMA 2005).

PSHA is used to determine the likelihood (probability of occurrence) that a given level of ground shaking could occur at a site from a combination of earthquake sources. The probability of

[7] Maximum design earthquake is an earthquake that would produce the maximum level of ground motion (shaking) for which a structure (e.g., TSF dam) is to be designed or evaluated.

occurrence (return period or recurrence interval) is an estimate of the probability or frequency that a certain event (e.g., earthquake) is expected to occur based on geologic and seismologic evidence. The PSHA accounts for the full range of possible earthquakes, location, frequency of occurrence, size, and propagation of the earthquake motion from the rupture zone to the site. The goal of the PSHA is to quantify the probability of exceeding ground motion levels at a site give all the possible earthquakes.

Peak ground acceleration (PGA) is traditionally used to quantify ground motion (shaking) and is generally a function of the magnitude of the event and distance from the source, but other factors may be considered, such as rock type or type of faulting. The PGA is typically expressed in terms of PGA measured as a fraction of gravity (g), with probability of exceeding a certain level over a specific period of time.

DSHA is based on known regional seismic sources and, unlike the PSHA, does not consider the probability associated with a particular earthquake hazard. In a DSHA, the fault movement that could cause the greatest level of ground shaking is determined and a specific magnitude event is applied.

Summary – The DSHA results can be described as a scenario: The maximum modeled event is a magnitude 6.9 earthquake 3.8 miles (6.1 kilometers) west of the TSF dam site on the Deadwood-Reeves Creek fault (URS 2013). This event would result in median calculated PGA of 0.43g. The PSHA results are presented in terms of PGA as a function of probability of occurrence. PSHA results indicate the PGA for 475-year and 2,475-year return period earthquake events are 0.10g and 0.14g, respectively. For context, a PGA of 0.1g in bedrock is considered the approximate threshold at which damage occurs in buildings that are not specially constructed to withstand earthquakes (FEMA 2006, FEMA 454: Chapter 4, Earthquake Effects on Buildings). The URS (2013) analysis results are similar to those of the USGS National Hazards Maps which are the basis for the U.S. building provisions and the International Building Code.

3.2.3.7 Mass Wasting Hazards

This section presents descriptions of mass wasting or geohazard features in the mine site, access road corridors, and proposed transmission line corridors. Mass wasting features in the mine site and access road corridors are described in Section 3.2.3.7.1 and Section 3.2.3.7.2, respectively. The terms used for mass wasting features in the EIS are described below.

Landslides – “Landslide” is a general term used to describe the downslope movement of soil, rock, and organic materials, or a combination thereof, under the effect of gravity. The term landslide also describes the landform that results from such movement (Highland and Bobrowsky 2008). Landslides are categorized based on type of movement (e.g., fall, topple, slide, spread, or flow) and the type of material involved (e.g., rock, earth, debris, or mud).

Landslide types include rockfalls, deep-seated slope failures, mudflows, debris flows[8], and slumps[9]. The type of flow and rate of movement vary with size and type of material, water content, and shape.

Landslides are generally caused by natural processes, such as earthquakes, mechanical weathering and erosion, water saturation, or human-made processes such as deforestation and slope excavation. In many cases, a landslide is triggered by a specific event, such as heavy rainfall, an earthquake, or a slope cut to build a road, although the cause of the failure is not always identifiable or predictable.

Many of the very large landslides in the area are likely post-glacial features. During glaciation large chunks of ice may become buried in glacial till. When the ice melts after glaciation, the materials can become unstable, resulting in large landslides. Some of the larger geohazards features depicted on **Figure 3.2-5** may have occurred through this process. An example is the landslide identified on the east side of the East Fork South Fork Salmon River (EFSFSR) north of the camp area (STRATA 2014a).

Landslides occur in a variety of environments, characterized by either steep or gentle slope gradients. While slope is in important factor, cohesiveness of the materials and moisture also are important factors.

The top of a slope immediately above a slide, or slope failure, is referred to as the crown, and the exposed failure surface below the crown is called a scarp. The end of a landslide is referred to as the toe, and the top of the landslide is called the head. The main body of the landslide may have radial or transverse cracks and transverse ridges.

Avalanche – An avalanche is a slope failure composed of a mass of rapidly moving, fluidized snow and ice that slides down a mountainside. After initiation, avalanches usually accelerate rapidly and grow in mass and volume as they entrain more snow and ice. Avalanches can pick up debris from the ground, including soil, rock, large boulders, and trees.

The slope failure associated with an avalanche is caused by several factors, but primarily by large accumulations of snow on a steep slope. Avalanches occur on slopes averaging 25 to 50 degrees, and the majority are on slopes between 30 and 40 degrees. They are triggered by natural seismic or climatic factors such as earthquakes, thermal changes, and blizzards, or by human activities (Idaho Office of Emergency Management 2018).

[8] Debris flow is a mass of soil and/or fragmented rock in slurry of water that moves downslope under the influence of gravity and forms muddy deposits in valley floors.

[9] Slump as defined for the EIS: Geohazard assessment reports (STRATA 2013, 2014a, 2016) use the term “slough” and “slump” interchangeably to refer to “small landslides” of less than 0.1 acre. For purposes of consistency, this EIS uses the term “slump” in the text. However, figures originating from the referenced geohazard assessment report may still retain the use of “slough.”

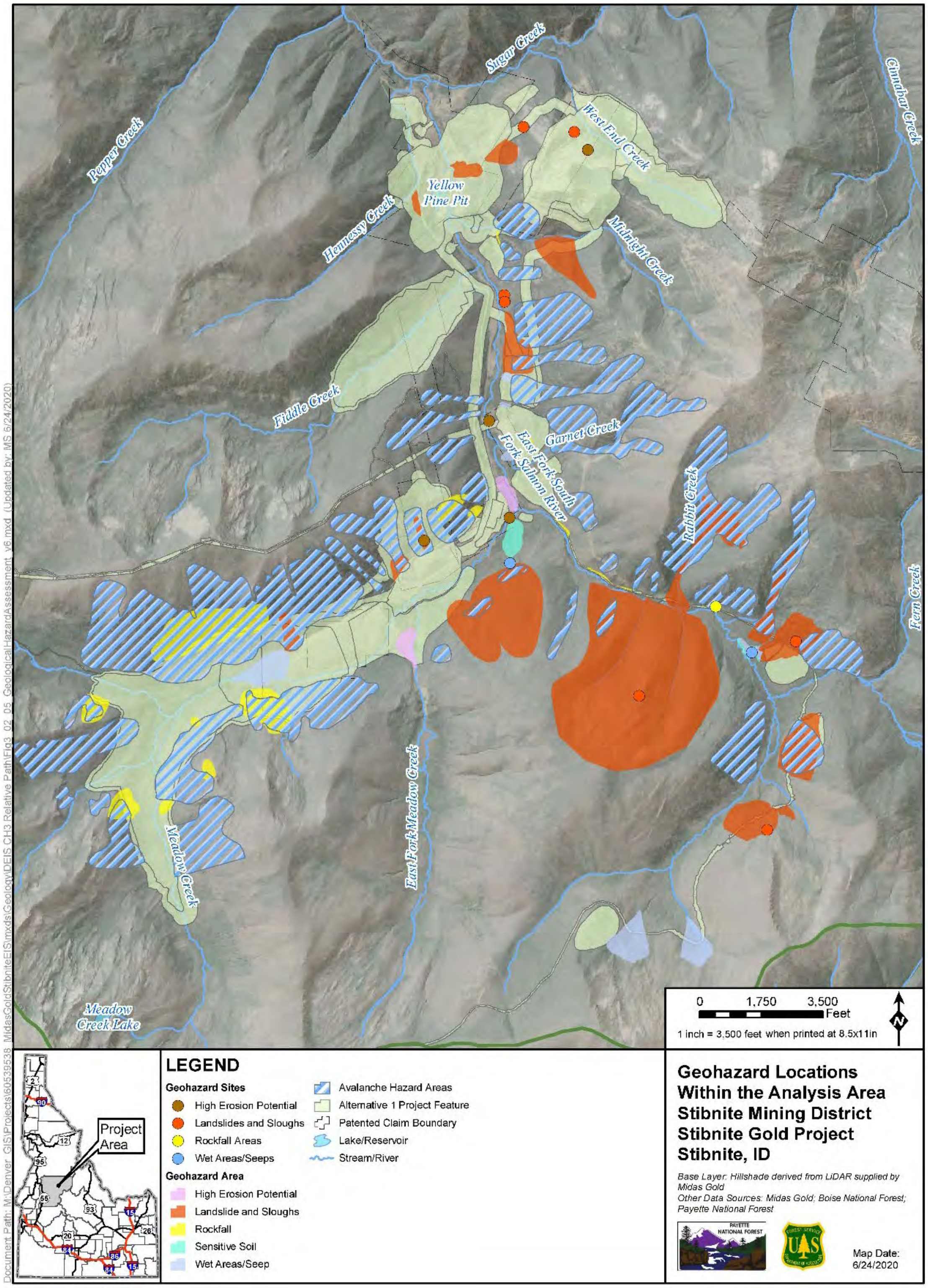

Figure Source: Mears and Wilbur Engineering 2013 (as modified by Midas Gold 2020); STRATA 2014a

Figure Notes:

The term slough is used synonymously with slump on **Figure 3.2-5**

Figure 3.2-5 Geohazard Locations within the Analysis Area

The most common types of avalanches are loose-snow and slab avalanches. A loose-snow avalanche is composed of dry, fresh snow deposits that accumulate as an unstable mass atop a stable snow and slick ice sublayer. A loose-snow avalanche releases when the sheer force of its mass overcomes the underlying resistant forces of the cohesive layer. A slab avalanche generally is composed of a thick, cohesive snowpack deposited or accumulated on top of a light, cohesion-less snow layer or slick ice sub-layer. At the starting surface or top of the slab, a deep fracture develops in the slab of well-bonded, cohesive snow. A slab avalanche release is usually triggered by turbulence or impulse waves.

An avalanche path is determined by the physical limitations of the boundaries of the local terrain and human-made features. An avalanche may follow a path along a channelized or confined terrain, similar to debris flows or streams, before spreading onto alluvial fans or gentle slopes. An avalanche path is described as having three specific transition zones:

- The Starting Zone is typically located near the top of the ridge, bowl, or canyon, with steep slopes of 25 to 50 degrees;
- The Track Zone is the reach with mild slopes of 15 to 30 degrees and the area where the avalanche will achieve maximum velocity and considerable mass; and
- The Runout Zone is the area of gentler slopes (5 to 15 degrees) located at the base of the path, where the avalanche decelerates, and massive snow and debris deposition occurs (Idaho Office of Emergency Management 2018).

3.2.3.7.1 MINE SITE

The following subsections describe known landslide and avalanche hazards in the vicinity of the mine site based on geologic hazard assessments (STRATA 2014a, 2016) and an Avalanche Hazard Assessment for portions of the mine site (Mears and Wilbur Engineering Inc. 2013). **Figure 3.2-5** shows landslide and rockfall (slope failure comprised of rock) features in the vicinity of the mine site, as well as avalanche paths within the central mine site area.

Northern Area: Yellow Pine and West End Pits

The terrain in the northern mine site area is relatively steep with natural timbered slopes as steep as approximately 31 degrees (1.67H:1V). Waste rock disposal areas from previous mining activity are northeast of the historic Homestake pit (the site of northeastern end of proposed Yellow Pine pit) and to the southeast of the historic West End pit. The Homestake disposal area has an upper ground surface sloping toward the north-northwest ranging from 15.4 to 24.8 degrees (3.63H:1V to 2.17H:1V). Along the northern edge (toe) of the disposal area the slope is steeper, averaging 29.7 degrees (1.75H:1V), with a maximum height of the disposal along this north crest of approximately 80 feet (STRATA 2013).

West End Creek has two waste rock dumps from the Stibnite Mining, Inc. operations. The Lower West End waste rock dump is north of the West End Pit and is close to 300 feet in total height, The Upper West End waste rock dump is east of the West End Pit and has an upper surface covering over 7 acres, and the dump height is at least 400 feet (Stibnite Mining Inc. 1994).

Two slumps, four landslides, and a rockfall are noted in this area (**Figure 3.2-5**). The isolated slumps likely were caused by oversteepening of the slope due to road cuts and the presence of groundwater seepage near or at the ground surface. Potential rockfalls are primarily related to former open-pit mining slopes in the Homestake pit, West End pit, and the Stibnite pit.

The Avalanche Hazard Assessment (Mears and Wilbur Engineering 2013) did not include an assessment of avalanche hazards in the vicinity of the proposed Yellow Pine and West End pits.

Central Area: Mine Support Facilities

The Central Area extends south of the Yellow Pine pit and encompasses most of the proposed mining support facilities and northern portion of the Fiddle DRSF. and is in or adjacent to the EFSFSR valley floor, a relatively flat area. Geologic materials are comprised of alluvium, glacial deposits, and ancient landslide deposits (STRATA 2013). Potential geohazards identified in the Central Area are shown on **Figure 3.2-5** and include two slumps, one landslide, three rockfalls, and three areas with groundwater seeps.

Two relatively small slumps occur in old road cuts along a now obscured former access road. One of the slumps approximately 20 feet high and 140 feet long and has a slope of about 45 degrees measured at mid-slope. The other slump is just north of the first slump and measures 100 feet long by 50 feet high. Groundwater seeps produce minor localized flows (less than 3 gallons per minute) of surface water at both sites, suggesting that seeps and elevated groundwater may have helped initiate these slope failures (STRATA 2014a).

A larger landslide, approximately 1,000 feet wide, covers several acres to the east of the EFSFSR and is believed to be a post-glacial landslide. The toe run-out area of the landslide relatively flat (12 to 15 degrees). A groundwater seep also occurs near the south margin of the landslide, suggesting that high groundwater levels during a period of glacial melting likely triggered this slide in moderately sloping terrain (STRATA 2014a).

Directly behind and to the east of the core building at the exploration camp is a rock outcrop producing a rockfall comprised of angular cobbles and small boulders. This feature appears to be about 250 feet long by about 30 feet high based on the information provided in STRATA (2014a, Figure Detail B and Photo 8). The hill slope to the west of the confluence of Meadow Creek and the EFSFSR has large steep outcrops of quartz monzonite. Rockfall from these outcrops could possibly reach infrastructure (e.g., rock crusher) proposed near the base of that slope (STRATA 2014a).

Mapped avalanche paths in this area are mostly on the slopes to the east of Meadow Creek. Some are mapped between the proposed cell tower access road and new transmission line (**Figure 3.2-5**) (Mears and Wilbur Engineering 2013).

Southwest Area: Hangar Flats Pit and SODA

The Southwest Area is within the relatively flat valley floor of Meadow Creek. The area is the proposed location for the Hangar Flats pit. The SODA is currently upstream from the former Hecla heap leach pad in this same terrain.

On the adjacent hillsides to the north, slopes are as steep as 35 degrees (1.43H:1V); whereas, the steepest slopes to the south are approximately 26.5 degrees (2H:1V).

Based on reconnaissance and helicopter fly-over observations, five landslides were identified in this area by STRATA (2014a) (**Figure 3.2-5**):

- A narrow (about 200 feet wide) debris flow scar originating near the Meadow Creek Mine portal and extending approximately 500 feet downslope to the valley floor (STRATA 2014a, Figure Detail C, feature LS-7)
- A narrow (about 300+ feet wide) landslide area in a shallow drainage on the north hillside near the west end of the SODA. Shallow groundwater likely is causing the slippage in this area, and several small, partially healed ground-surface scars suggest that localized debris-flow pockets likely have developed during recent wet periods (STRATA 2014a, Figure Detail C, Feature L-8).
- A slow-moving landslide (i.e., creep) (approximately 20 acres) in the mouth of the drainage (a northeast-southwest trending tributary to Meadow Creek) is present above the west end of the Hecla heap leach site. The area is characterized by shallow groundwater (as evidenced by vegetation in the area) and deformed aspen trees caused by the slope creep. The trees indicate progressive slope movement over the past 15 to 20 years. The toe of the landslide is near the projected toe of the rock waste dump and could be a concern for infrastructure developed in this location (e.g., a haul road or slurry pipeline) and may need to be considered in design (STRATA 2014a, Figure Detail C, Feature LS-9).
- Two landslide features occur on the northwest-facing hillslope to the south of the Meadow Creek confluence with EFSFSR and extending to the mouth of Blowout Creek. One is characterized by irregular hummocky ground and seeps indicate past landslide activity covering approximately 80 acres. Several springs and seeps (wet, spongy ground) are present along the lower portion of this landslide complex in the area (STRATA 2014a, Figure Detail C, features LS-10 and LS-11). A smaller slump in a road cut is present about half-way downslope and to the west. This slump area appears to be several years old and has been treated with staked erosion control matting; new vegetation is established in the scar.

The majority of the SODA and the proposed Hangar Flats DRSF are within mapped avalanche hazard zones (**Figure 3.2-5**) (Mears and Wilbur Engineering 2013).

Southeast Area: EFSFSR and Worker Housing Facility

The terrain in this region is primarily in or adjacent to the valley floor of the upper reaches of the EFSFSR and is relatively flat. Geologic materials in this area are comprised of alluvium, glacial deposits, ancient landslide deposits, and lacustrine peat-like deposits.

Landscape features are dominated by glacial deposits, particularly lateral moraines and a large ancient landslide on the south hillside of the drainage, approximately one mile upstream of the confluence of the EFSFSR and Meadow Creek (STRATA 2014a).

Three landslides were identified in this area (although one of the landslides also was described as being in the Southwest Area (STRATA 2014a, Detail Figure D, feature L-11). This feature is described above under “Southwest Area.” The other two landslides are described below in addition to two areas that were observed with seeps, indicating a potential for future slides.

A large, ancient (glacial age) landslide covers at least 200 acres south of the EFSFSR and appears to have dammed the drainage in the past, likely forming the depositional area that is now a flat meadow. This area is characterized by hummocky ground and local areas of seeps, or wet areas with spongy ground. Though this area currently appears generally stable, smaller segments in the landslide complex may experience creep behavior during exceedingly wet periods. (STRATA 2014a, Detail Figure D, Feature LS-12).

There also is an ancient landslide upslope of the proposed worker housing facility in the EFSFSR valley about 1.3 miles upstream from its confluence with Meadow Creek. The run-out deposit of this event measures approximately 1,000 feet upslope and 400 feet wide (laterally across the slope) for an area of about 9 acres. Thunder Mountain Road (National Forest System Road 50375) crosses the central portion of this feature just east of the flat floodplain area. The head of the rockslide appears to be a vertical outcrop of quartz monzonite upslope from the road (STRATA 2014a, Detail Figure D, feature LS-13).

Avalanche hazard zones have been identified in Rabbit Creek valley and adjacent unnamed stream valley to the southeast, as well as directly east of the proposed worker housing facility. Additional avalanche hazards zones are mapped near the northernmost Burntlog Route borrow source (Mears and Wilbur Engineering 2013) (see **Figure 2.3-2**, Chapter 2 and **Plate 3A, Appendix E-1**).

3.2.3.7.2 ACCESS ROADS

This section addresses the identified mass wasting hazards along Burntlog Route and the Yellow Pine Route (which includes Johnson Creek Road, [County Road {CR} 10-413] and the Stibnite Road segment of McCall–Stibnite Road [Stibnite Road, CR 50-412]) between Yellow Pine and Stibnite. **Figure 2.3-1** (see Chapter 2, Alternatives) depicts both access road corridors. Previous evaluation of the risks used the following information sources:

- STRATA. 2016. Geologic Hazard Assessment Burntlog Access Road Project
- Mears and Wilbur Engineering. 2013. Avalanche Hazard Assessment

- Midas Gold. 2019a. Supplemental Response to Request for Additional Information 83 regarding Johnson Creek/Stibnite Road (Yellow Pine Route) for Primary Stibnite Gold Project Mine Access

These data were found to be insufficient to evaluate and compare the occurrence of mass wasting hazards present along the Yellow Pine and Burntlog routes because only the Burntlog Route has been the subject of a specific geologic hazard assessment (STRATA 2016). No geologic hazard assessment, including field reconnaissance, has been conducted to date for the Yellow Pine Route. Therefore, as part of preparation of the EIS and to enable a general comparison of identified hazards between the Yellow Pine and Burntlog routes, a desktop study of both corridors was conducted (**Appendix E-2**).

The desktop study (**Appendix E-2**) was conducted to identify probable landslides, rockfalls, and avalanche paths along the transportation corridors based on imagery from Google Earth (2020) using the following methods:

- *Landslides* – Landslide hazards were identified along existing road cuts based on vegetation signatures and evidence of migrating slope failures up-slope of the road prism. Data from STRATA (2016) was considered along both existing and proposed roads.
- *Rockfalls* – Rockfall hazards were identified along existing road cuts based on vegetation signatures, substrate color, and evidence of slope erosion upslope of the existing road prism. Information from STRATA (2016) was considered along both existing and proposed roads.
- *Avalanche Paths* – Avalanche paths were identified based on vegetation signatures and supplemented with slope calculations (30 to 45 degrees) using measurement tools in Google Earth and compared to data from *Avalanche Hazard Assessment* (Mears and Wilbur Engineering 2013) and Supplemental Response to Request for Additional Information 83 regarding the Yellow Pine Route (Midas Gold 2019a).

Locations of identified hazards along each corridor were assigned a unique identifier with the following information: latitude, longitude, horizontal distance of estimated impact to the road prism, and estimated acreage of the feature. The coordinate identifier locations represent the estimated center of the feature. All calculations and values were derived from mapping and measurement functions included in Google Earth (2020). Values are presented for comparison purposes only. Future field investigations may identify additional geohazards not identified via aerial photographs. **Figure 3.2-6** depicts identified geohazards based on all sources of available information and the desk top study.

3.2.3.7.2.1 Burntlog Route

Landslide and slope instability hazards have been assessed along the proposed Burntlog Route, including in-field observations (STRATA 2016). Maps depicting locations of landslide hazards along the proposed Burntlog Route as discussed in STRATA 2016 are provided in **Appendix E-1**. Visual evidence of slope instability was reported at several locations along the route. Observed slumps are likely associated with groundwater seeps on steep slopes, with the plane of the features tending to be shallow. Because failure is likely associated with groundwater seepage, seepage also was mapped to identify areas that may be prone to failure (STRATA 2016).

STRATA (2016) identified rockfalls along the Burntlog Route. Potential rockfall areas are primarily tied to existing road cuts occurring in both glacial till/colluvium and granitic outcrops. Areas that may be prone to rockfall were observed in the road cuts as rounded and/or angular cobbles and small boulders in other locations. These soils and rock cut slopes range from 30 to 60 degrees and range in height from 10 to 20 feet.

3.2.3.7.2.2 Yellow Pine Route

The Yellow Pine Route includes Johnson Creek Road (CR 10-413) and Stibnite Road (CR 50-412). There is documentation of avalanches and landslides along this corridor (Midas Gold 2019b):

- In March 2014, a series of avalanches blocked Stibnite Road (CR 50-412) in two locations and caused the river to reroute onto the road. The largest slide extended over the road for more than 50 feet and was at least 14 feet deep (Midas Gold 2019b).
- In April 2019, a series of avalanches and related landslides caused extensive damage to Stibnite Road (CR 50-412), resulting in closure of the road for approximately two months. The slides pushed snow, timber and other debris into the EFSFSR and up onto Stibnite Road, and sections of the road near Tamarack Creek were washed away. In places, the slide was nearly 100 feet high (Midas Gold 2019b).

Identified geologic hazards, including those based on the desktop study (**Appendix E-2**) are depicted on **Figure 3.2-6**.

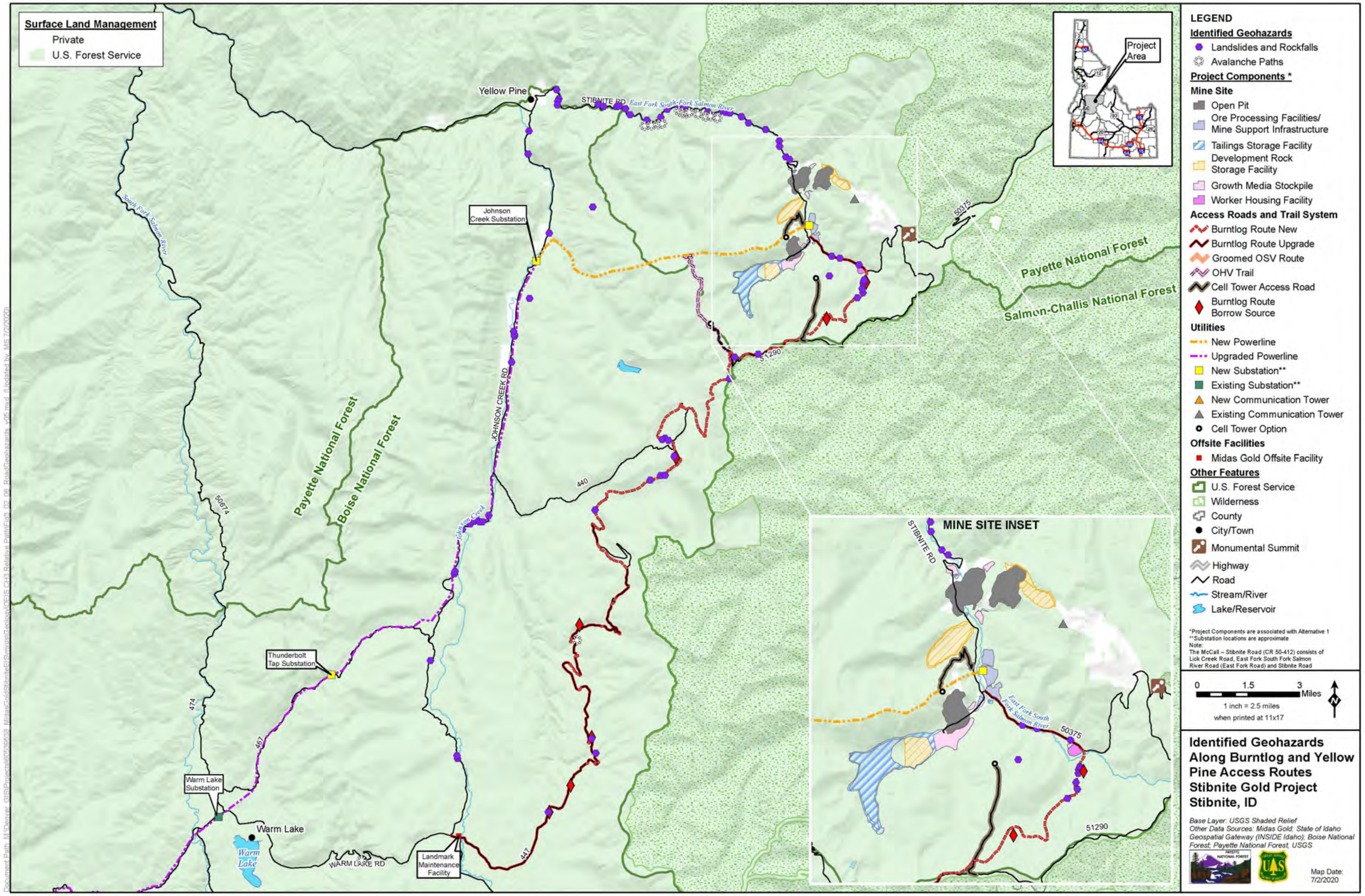

Figure Source: Google Earth 2020; STRATA 2016; Weppner et al. 2017

Figure 3.2-6 Identified Geohazards along Burntlog and Yellow Pine Access Routes

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3.2.3.7.3 Summary of Geohazards – Access Routes

Table 3.2-1 provides total geohazards identified along the Burntlog and Yellow Pine (Johnson Creek Road and Stibnite Road) access routes based on desktop study with supporting information sources.

Table 3.2-1 Total Identified Geohazards

Access Route	Landslides and Rockfalls			Avalanche Paths		
	Total Number	Length of Road Impacted (feet)	Area (acres)	Total Number	Length of Road Impacted (feet)*	Area (acres)*
Burntlog Route	26	15,043	482.5	2[2]	590	2.4
Johnson Creek Road (CR 10-413) and Stibnite Road (CR 50-412)	45[1]	22,425	145.3	12	27,043	108

Table Source: Google Earth 2020; Mears and Wilbur Engineering 2013; Midas Gold 2019a, Mears 1992; STRATA 2016; Weppner et al. 2017

Table Notes:

1 Total does not include two slump features along Johnson Creek Road. The slumps are not currently impacting the road prism.

2 Weppner et al. 2017 describes an area with “two or three” avalanche paths south of the road crossing at East Fork Burntlog Creek.

* Estimated based on Google Earth 2020.

Six landslides and 20 rockfalls were identified along the Burntlog route. One area south of the road crossing at East Fork Burntlog Creek has two to three avalanche paths (Weppener et al. 2017).

Along the Yellow Pine Route, 11 landslides and 8 rockfalls were identified along Johnson Creek Road (CR 10-413). Fifteen landslides and 11 rockfalls were identified along Stibnite Road (CR 50-412). No avalanche paths were identified along Johnson Creek Road (CR 10-413), but 12 avalanche paths were identified along Stibnite Road (CR 50-412).

In addition to the two corridors described above, the Forest Service notes an avalanche path along Warm Lake Road that would be part of the transportation corridor common to both the Burntlog and Yellow Pine routes (Forest Service 2020). This feature was observed in Google Earth during the desktop study and the location is depicted on **Figure 3.2-6**.

3.2.3.8 Geotechnical Characteristics

This section provides a summary of existing subsurface conditions within the analysis area, focusing on key SGP components: open pit areas (Yellow Pine, West End, and Hangar Flats), the TSF, DRSFs (Yellow Pine, West End, Fiddle, and Hangar Flats), EFSFSR tunnel, ore processing facility and Scout exploration decline, and worker housing facility. This information is intended as a summary of current conditions and the affected environment and is based on investigations conducted by others to support engineering related to mine waste management facilities and infrastructure foundations.

3.2.3.8.1 Open Pit Areas

Three open pits are proposed at the mine site: the Yellow Pine pit and West End pit in the northern part of the mine site, and the Hangar Flats pit, along the Meadow Creek drainage, in the southern part of the mine site. Historic open-pit mining has been conducted in the Yellow Pine and West End areas; whereas, previous mining activity at Hangar Flats was underground (Meadow Creek Mine) (Midas Gold 2016).

Geologic and geotechnical conditions have been well characterized at the mine site by information derived from several studies conducted over multiple field seasons. Studies included drilling, sampling, and logging boreholes, standard penetration tests, cone penetrometer tests, geotechnical laboratory tests (e.g., particle size distribution, Atterberg limits, direct shear), groundwater monitoring wells, piezometers, aquifer slug tests, as well as specific structural geology investigation and a pit slope design study. A comprehensive discussion of available information is provided in the Stibnite Gold Project Geotechnical Investigations Summary Report (Tierra Group 2018) and the Geotechnical Baseline Summary (STRATA and Tierra Group 2017).

3.2.3.8.1.1 Overburden

Yellow Pine Pit

Observed overburden thickness in the area northwest of the planned Yellow Pine pit ranges from 47 to at least 180 feet, and depth to bedrock generally increases toward the west. The uppermost material in boreholes drilled approximately 2,000 feet to 750 feet northeast of the outline of the Yellow Pine pit (boreholes SRK-GM-02s through SRK-GM-04S) consists of development rock from legacy mining activities (STRATA and Tierra Group 2017). Native soil beneath the development rock is mostly sand, with some gravel. Measured hydraulic conductivity ranges from 0.31 to 56.7 feet per day (feet/day) (SRK Consulting [SRK] 2012). These values were determined using data from six slug tests (one slug test from each of six wells).

Overburden depth in the area south of the Yellow Pine pit (boreholes SRK-MG-07S, SRK-MG-11S, and SRK-GM-12S) ranges from 47 to 61 feet and consists mostly of sand and gravel, with occasional layers of silt noted in the borehole logs. No hydraulic conductivity testing was reported for this southern area.

Moisture content and soils classification tests were performed on selected fine-grained samples from the boreholes. Atterberg Limit tests were performed according to American Standard for Testing and Materials D4318 (SRK 2012). These tests are used to classify fine-grained soil (silts and clays). Results of the tests indicate the fine-grained fraction of the tested samples are generally low plasticity[10] silts and clays.

West End Pit Area

Two borings were drilled into the overburden at the West End pit. Two surficial grab samples were collected at the West End pit; the soils were classified as: clayey silty sand with gravel with low plasticity and silty sand that is non-plastic (STRATA 2014a).

Hangar Flats Pit Area

Information from deep exploration drilling in this area indicates that depth to bedrock increases greatly with distance from adjacent valley slopes, suggesting a deep U-shaped valley, filled with fluvial material overlying glacial deposits. Overburden thickness is greatest in the southcentral area, where the depth to bedrock was noted to be more than 250 feet (borehole SRK-GM-22S). Surficial soils were moderately dense to dense sands with some gravel and occasional silt layers. Beneath the surficial layers, the soils are mostly sand and gravel inter-bedded with silty sand. At depths greater than 200 feet, clayey sand and clayey gravel were encountered.

Atterberg Limit tests were performed on two overburden samples (one from each of two borings). Test results of these samples indicate low plasticity in both samples (SRK 2012).

3.2.3.8.1.2 Structural Features

Structural orientations of faults and joints were measured at rock exposures (as well as the width, infill, and kinematic indicators, if present). Lower-hemisphere stereonet plots of poles-to-planes indicated mostly moderately dipping to steeply dipping structures, with joint orientations generally similar to fault orientations. Occasionally, joint sets were oriented nearly perpendicular (conjugate) to fault orientations. In addition to examination of surface exposures, oriented boreholes were drilled in the Yellow Pine pit, West End pit and Hangar Flats pit areas and continuous rock core was sampled (Tierra Group 2018).

Yellow Pine Pit Area

The predominant structural feature in the Yellow Pine pit area is the MCFZ, which generally is north-northeast striking and steeply dipping to the west or northwest. Associated with the zone are north-striking, west-dipping conjugate splay or cross structures. The widest recognized section of the fault zone is about 190 feet wide. Other faults in the area tend to be sub-parallel to the MCFZ; these include the Hennessy Fault, Hanging Wall Shear Fault, C-Shear Fault, Meadow Creek Hanging Wall Fault, and Meadow Creek Footwall Fault.

[10] Plasticity of soil is the property by which it undergoes deformation without cracking or fracturing. In general, soils with low plasticity are more geotechnically stable than soils with high plasticity.

West End Pit Area

The predominant structural feature is the WEFZ, which generally is striking at azimuth 30 degrees and dipping 50 to 75 degrees southeast, and includes the Hanging Wall, Middle, and Footwall faults. Relative offsets in the metasediments here suggest right-lateral displacement and normal displacement. Several subsidiary structures extend southeast from the WEFZ, striking 60 to 90 degrees with near vertical dips. In the West End pit area, metasediment bedding primarily dips northeasterly at 60 to 85 degrees.

Hangar Flats Pit Area

The predominant structural feature is the MCFZ, which generally is north-striking and steeply dipping (nearly vertical). Associated with the zone are northeast or east-trending, nearly vertical conjugate structures. Splays of the MCFZ are common and trend northeast, with shallow dips to the northwest. The MCFZ is a broad structural zone, marked by intense shearing, characterized by fault breccia and gouge.

3.2.3.8.1.3 Hydrogeological Data

Hydrogeology refers to the distribution and movement of groundwater. Groundwater occurs in void spaces (i.e., pore spaces) in soil and sediment and in openings (e.g., faults, joints) in bedrock. Characterization of the hydrogeology is important to determine both whether these resources would be affected by a project and whether the hydrogeology of the area could affect proposed infrastructure. This information is important for planning aspects such as pit excavation, design, and for water management and treatment practices. Several methods are used in hydrogeologic investigations such as installation of monitoring wells or piezometers[11] to determine groundwater levels, and pumping tests or slug tests of the wells to help determine hydraulic conductivity. Hydraulic conductivity is the ability of earth materials to allow water to move through saturated pore spaces or fractures in subsurface material. In addition, seeps (also called springs) indicate the presence of groundwater. Seeps can emerge in hillside areas where the natural topography intersects the water table – allowing the groundwater to flow out the side of the hill. Seeps also can occur where an excavated slope (such as a road cut or pit excavation) were to intersect the water table. Seeps along a hillside or pit wall can indicate saturated conditions in the soil, sediment or rock and could indicate potential areas of mass wasting. Section 3.8, Surface Water and Groundwater Quantity, provides more information about movement and volume of water and water management at the mine site, including modeling to support characterization of existing conditions.

As part of the geotechnical and hydrological investigation program conducted for the SGP, the hydrogeologic evaluation in the pit areas (SRK 2013) included installation of vibrating-wire piezometers within the rock mass in seven of the 13 boreholes (four boreholes in the Yellow Pine pit area, two in the West End pit area, and one in the Hangar Flats pit area) and injection packer tests in 10 of the boreholes (five boreholes in the Yellow Pine pit area, two in the West

[11] A piezometer is a device placed in a borehole to measure the underground pressure of groundwater – effectively measuring the level to which the groundwater would rise without a confining (e.g., clay, silt) layer.

End pit area, and three in the Hangar Flats pit area). Groundwater levels in overburden are typically less than 100 feet below ground surface (Brown and Caldwell 2017).

Hydraulic conductivity values are in the typical low to mid-range for bedrock, ranging from less than 0.0003 to 0.57 feet/day. Lower hydraulic conductivity values are more common with depth, thus supporting the typical trend of decreasing hydraulic conductivity with increasing depth for all pit areas.

3.2.3.8.1.4 Pit Slope Design

Several studies were performed to evaluate pit slope design (STRATA 2014b). As part of these studies, detailed scanline mapping (i.e., mapping structures as they intersect a line) and outcrop structure mapping (i.e., mapping of underlying rock using surface outcrops) were conducted at a total of 16 accessible rock outcrops in the pit areas (at 10 scanline and 6 structure mapping sites). Fracture orientation and characteristics were measured in oriented core boreholes. The STRATA (2014b) study found that the rock at all three pits consisted predominately of quartz monzonite and quartzite. These rock types are typically very competent. Defect intensity describes how easily the core breaks by gently hitting with a hammer. The defect intensity for all the pits ranged from minor to moderate.

Rock engineers widely use the unconfined compressive strength of rocks in designing surface and underground structures. Concrete has an unconfined compressive strength of approximately 14 to 42 megapascals. Rock at the mine site had a compressive strength that ranged from 11.2 to 123.1 megapascals (1,624 pounds per square inch to 17,854 pounds per square inch). This wide range of compressive strength reflects the various rock types and alteration present in the area.

3.2.3.8.2 TAILINGS STORAGE FACILITY

Thirty-five boreholes were drilled at the TSF during multiple investigations. Twelve boreholes were drilled and completed as standpipe piezometers (Tierra Group 2018, Figure 1.1 and Figure 2.1 depict the SRK 2013, 2017, and 2018 borehole locations for the TSF). The depth to bedrock along the center of the valley ranged from 20 (drilled to refusal, borehole UMC-17-26, Tierra Group 2018) to 97 feet below ground surface (borehole TG-17-13, Tierra Group 2018) and is shallower to the southwest. The spent ore and tailings were up to 100 feet thick at the SODA. The soils generally consist of alluvial and colluvial sands and gravel with some glacial till also observed.

Depths to groundwater ranged from 0 up to 34 feet below ground surface at the TSF. One slug test was performed with hydraulic conductivity reflective of coarse-grained sand and gravel (SRK 2012).

Laboratory testing on samples taken from the TSF area included moisture content and density, grain size distribution, Atterberg limits, triaxial shear, direct shear, modified Proctor, and relative density. A full description of these geotechnical investigations, stratigraphy, and laboratory testing is provided in the Geotechnical Investigations Summary Report (Tierra Group 2018).

To date there is no available geotechnical information for the Alternative 3 TSF location in the EFSFSR drainage (See Chapter 2, Alternatives).

3.2.3.8.3 DEVELOPMENT ROCK STORAGE FACILITIES

3.2.3.8.3.1 Hangar Flats DRSF

Sixty-seven boreholes were drilled at the Hangar Flats DRSF site during multiple investigations, with 42 of these boreholes specific to the SODA. Four standpipe piezometers were installed. Native soils generally consist of alluvial and colluvial sands and gravel. Bedrock was encountered at depths ranging from 90 to 180 feet below ground surface. Up to 75 feet of spent ore, and 55 feet of Bradley tailings were encountered,

Depths to groundwater ranged from 5 to 88 feet below ground surface. Two slug tests were performed with hydraulic conductivities reflective of silty sand, sand, and gravel (SRK 2012).

Laboratory testing on samples collected from the Hangar Flats DRSF area includes moisture content and density, grain size distribution, Atterberg limits, triaxial shear, direct shear, standard Proctor compaction text, and relative density. A full description of these geotechnical investigations, stratigraphy, and laboratory testing and results is provided in the Geotechnical Investigations Summary Report (Tierra Group 2018).

3.2.3.8.4 FIDDLE DRSF

Five boreholes were drilled at the Fiddle DRSF site during multiple investigations (Tierra Group 2018). No standpipe piezometers were installed. The native soils consist of alluvial and colluvial sands and gravel over bedrock. Bedrock depths range from 25 to 65 feet below ground surface. Depths to groundwater varied from 15 to 17 feet below ground surface. Slug testing was not performed.

No laboratory testing was performed on samples collected from the Fiddle DRSF area. This may be because the materials were too coarse-grained to result in meaningful laboratory tests (although this is not stated in the referenced report). A full description of the geotechnical investigations, stratigraphy, and laboratory testing is provided in the Geotechnical Investigations Summary Report (Tierra Group 2018).

3.2.3.8.4.1 West End DRSF

Three borings were drilled at the proposed West End DRSF and pit footprint area to characterize the rock mass (Tierra Group 2018). The West End pit geotechnical information is applicable to this area.

3.2.3.8.4.2 Yellow Pine DRSF

The Yellow Pine DRFS is wholly within the Yellow Pine pit and would be underlain by bedrock. Yellow Pine DRSF would be a pit backfill, within the Yellow Pine pit long after overburden is removed from the area. Overburden geotechnical investigations reported below are therefore irrelevant to the DRSF (which would be constructed on rock pit walls, and constructed from development rock originating primarily from West End pit), but may inform analysis of the materials' performance once moved and used at other destinations (Fiddle DRSF, TSF embankment, Hangar Flats DRSF, roads), Yellow Pine pit walls, and tunnel and tunnel portal areas. Fifteen boreholes were completed at the Yellow Pine DRSF during multiple investigations, including five boreholes to classify the rock mass (no overburden geotechnical data was collected for these five boreholes). Ten standpipe and one vibrating wire piezometers were installed. Native soils consist of alluvial and colluvial sands and gravel. Bedrock was encountered at depths ranging from 47 to over 180 feet below ground surface.

Depths to groundwater ranged from 15 to 100 feet below ground surface. Six slug tests were performed.

Grain size distribution and Atterberg limits tests were performed on samples taken from the Yellow Pine DRSF area.

A full description of these geotechnical investigations, stratigraphy, and laboratory testing is provided in the Geotechnical Investigations Summary Report (Tierra Group 2018).

3.2.3.8.5 EFSFSR Tunnel

Eleven boreholes, ranging in length from 56 to 695 feet, were drilled along the EFSFSR tunnel alignment during multiple investigations, and additional overburden and bedrock boreholes were drilled nearby for Yellow Pine pit exploration and geotechnical investigations to aid interpretation of subsurface conditions. Overburden near the tunnel portals consists of legacy development rock and native glacial till ranging in grain size from silt through boulders. Depth to groundwater in overburden near the portals ranged from 24 to 55 feet, and depth to bedrock was 55 to 136 feet. All holes were advanced into bedrock except one auger hole that terminated at bedrock. Core drilling along and near the tunnel alignment intersected schist and intrusive (dioritic to granitic) bedrock, and inclined holes crosscut the Hennessy Shear Zone and MCFZ along the tunnel alignment. Bedrock along the tunnel alignment is generally unaltered to weakly altered and weakly mineralized. Hennessy Shear Zone and MCFZ feature fractured intrusive rock, with zones of gouge and breccia. Hydraulic packer testing was conducted in fractured rock of the Hennessy Shear Zone. Four seismic refraction geophysics lines were completed at the portals to define the bedrock profile.

A full description of these geotechnical investigations, stratigraphy, rock mass characterization, and geophysics is provided in the *Geotechnical Investigations Summary Report* (Tierra Group 2018) and EFSFSR Tunnel Design Documentation Report (McMillen Jacobs 2018).

3.2.3.8.6 Ore Processing Facility and Scout Exploration Decline

Twenty-four geotechnical boreholes and groundwater monitoring wells were completed at the area of the ore processing facility and proposed Scout exploration decline during multiple investigations. Two standpipe piezometers were installed and several monitoring wells were completed, although several were dry. Native soils consist of alluvial and colluvial sands and gravel. Bedrock was encountered at depths ranging from 5 to 97 feet below ground surface.

Depth to groundwater ranged from 8 to 48 feet below ground surface. No slug tests were performed.

Laboratory testing on samples taken from the Ore Processing Facility area included moisture content and density, grain size distribution, Atterberg limits, and modified Proctor. A full description of these geotechnical investigations, stratigraphy, and laboratory testing is provided in the Geotechnical Investigations Summary Report (Tierra Group 2018).

3.2.3.8.7 WORKER HOUSING FACILITY AREA

Seven boreholes were completed at the Worker Housing Facility area during multiple investigations. No standpipe piezometers were installed. Native soils consist of alluvial and colluvial sands and gravel. Bedrock was encountered at depths ranging from 23 to 39 below ground surface (MGI-15-MC2 and MGI-15-MC3, respectively), but four boreholes were not advanced to bedrock.

Depth to groundwater ranged from 2 to 34 feet below ground surface. Slug tests were not performed.

Laboratory testing on samples taken from the Worker Housing Facility area included moisture content and density, grain size distribution, Atterberg limits, and modified Proctor. A full description of these geotechnical investigations, stratigraphy, and laboratory testing is provided by Tierra Group (2018).

3.2.3.9 Recent Tailings Dam Failures

Recent tailings dam failures at the Mount Polley Mine in 2014 and Fundão in 2015 have led to investigations on the reason for failure and recommendations for changes to management of tailings dams and regulatory standards and codes for tailings dams. A brief synopsis of these dam failures, and some of the recommended changes to tailings management and regulation that may occur, are provided in **Appendix E-3**.

3.3 AIR QUALITY

3.3.1 Introduction and Scope of Analysis

Air quality is the degree to which the ambient air is pollution-free and protective of public health, and is assessed by measuring a number of indicators of pollution. Air quality conditions are important from a human health and aesthetic (i.e., visual) perspective, and they also are subject to specific regulations, which are enforced to protect this resource. Local and regional air quality may be affected by the Stibnite Gold Project (SGP).

The affected environment area for the SGP for the air quality analysis is defined by two regions or "fields" for which different assessment tools are applicable. These regions are defined by the requirements of an air quality analysis, and the capabilities of the regulatory models provided for the assessments. The air quality impact analyses presented for the SGP adopt the U.S. Environmental Protection Agency (EPA) recommendations contained in 40 Code of Federal Regulations (CFR) Part 61, Appendix W for the analysis approach as defined for the two fields

The first region is the "near field," which is defined as a 50-kilometer (km)[1] radius from the proposed mine site, as shown on **Figure 3.3-1**. Dispersion modeling (i.e., modeling that simulates how air pollutants disperse in the atmosphere) to identify air quality impacts in the near-field region utilize Gaussian dispersion models. The near-field analysis focused on comparison of predicted concentrations of air pollutants with federal standards, and screening assessments of air pollutant deposition.

The second region is the much larger "far field," which is defined as a 300-km radius from the mine site that encompasses more distant Class I and Class II areas as described in Section 3.3.2, Relevant Laws, Regulations, Policies, and Plans, and shown on **Figure 3.3-1**. Mandatory federal Class I areas are national parks and wilderness areas afforded special air quality and visibility protections under the Clean Air Act. To meet the requirements of the far-field analysis for these protected areas, specialized air quality modeling was conducted to support the analysis. The far-field analysis for selected Class I and selected Class II areas assessed the SGP's contribution to regional haze and screened for air pollutant deposition impacts. Dispersion modeling is discussed in Chapter 4, Section 4.3, Air Quality.

Modeling within the near-field region included an analysis of potential impacts to "ambient air" as defined for the SGP. The term "ambient air," for modeling purposes, refers to a defined area where the public has access that is subject to the National Ambient Air Quality Standards (NAAQS). The NAAQS are promulgated to protect public health and welfare. Long-standing EPA policy has defined "ambient air" as "that portion of the atmosphere, external to buildings, to which the general public has access," and further that "the exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which

[1] Metric units, including kilometers (km), are used predominantly in this section because of permit and modeling standards. 1 km=0.6mi; 1mi=1.6km.

public access is precluded by a fence or other physical barriers” (EPA 2018c). More recent EPA policy expanded the range of measures that could be implemented to exclude the public from access, such as signage, monitoring of access, security surveillance, and similar effect measures (EPA 2019). In this case, the SGP public exclusion area is understood to be defined as the limits of the SGP Operations Area Boundary. The Operations Area Boundary establishes the inner boundary of the surrounding “ambient air” that represents the modeling domain for quantifying air quality effects in Chapter 4, Section 4.3.2, Direct and Indirect Impacts on Air Quality. As part of the air modeling analysis supporting the Stibnite Gold Environmental Impact Statement, and the air permit application to the Idaho Department of Environmental Quality (IDEQ), the Operations Area Boundary was set by the Midas Gold Idaho, Inc. (Midas Gold) air modeling contractor, and subsequently reviewed and approved by the U.S. Forest Service (Forest Service) and IDEQ (Air Sciences 2018).

A refined dispersion modeling analysis was conducted within a 10-km radius of the Operations Area Boundary, as shown on **Figure 3.3-2**. It was confirmed through preliminary modeling that the 10 km domain size was sufficient to characterize worst-case near-field air quality impacts for the SGP. Air quality effects would decrease at distances beyond the modeled 10 km range. The refined model used a “grid” of defined receptor points at which air pollutant concentrations are predicted by the model calculations. Receptor tiers of 25-meter (m)[2], 50-m, 100-m, 500[2]-m, and 1-km spacing beyond the Operations Area Boundary out to the 10-km extent of the modeled domain followed accepted regulatory modeling practice. Tighter spaced receptors closer to the Operations Area Boundary allowed the model to map, in more detail, the predicted close-in concentrations that are generally the highest.

To develop the far-field air quality analysis area, several agencies were consulted and included: National Park Service, U.S. Fish and Wildlife Service, EPA, IDEQ, Nez Perce Tribe air quality staff and the Pacific Northwest and Northern regions of the Forest Service. Based upon this group’s initial review of the plan, the four Class I areas (as shown in **Figure 3.3-3**) that far-field modeling results were reported for are: Sawtooth Wilderness [SAWT], Selway-Bitterroot Wilderness, Hells Canyon Wilderness [HECA]), and Craters of the Moon National Monument (CRMO). There are additional Class I areas within the 300-km radius; however, these are farther from the proposed mine site and in the same general cardinal directions as the four closer Class I areas. A tiered approach was adopted to initially analyze the closer Class I areas that would likely have greater potential for air quality or visibility impacts. If the impacts predicted at the four closer Class I areas indicated potential for impacts at greater distances, then additional analyses would have been conducted for the more distant Class I areas.

[2] 1 meter (m)=3.3 feet; 1 foot=0.3 meter.

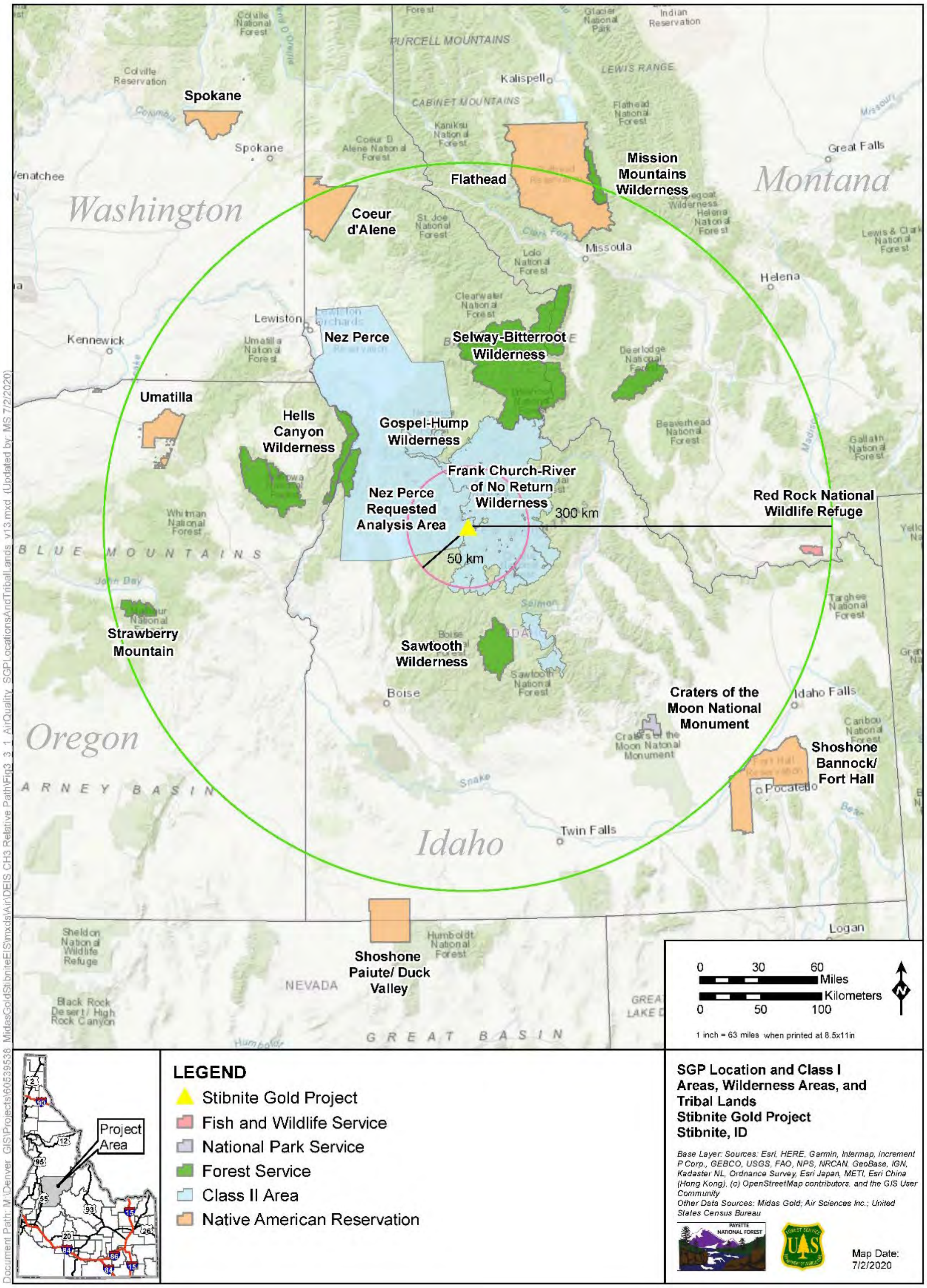

Figure Source: AECOM 2020

Figure 3.3-1 SGP Location and Class I Areas, Wilderness Areas, and Tribal Lands

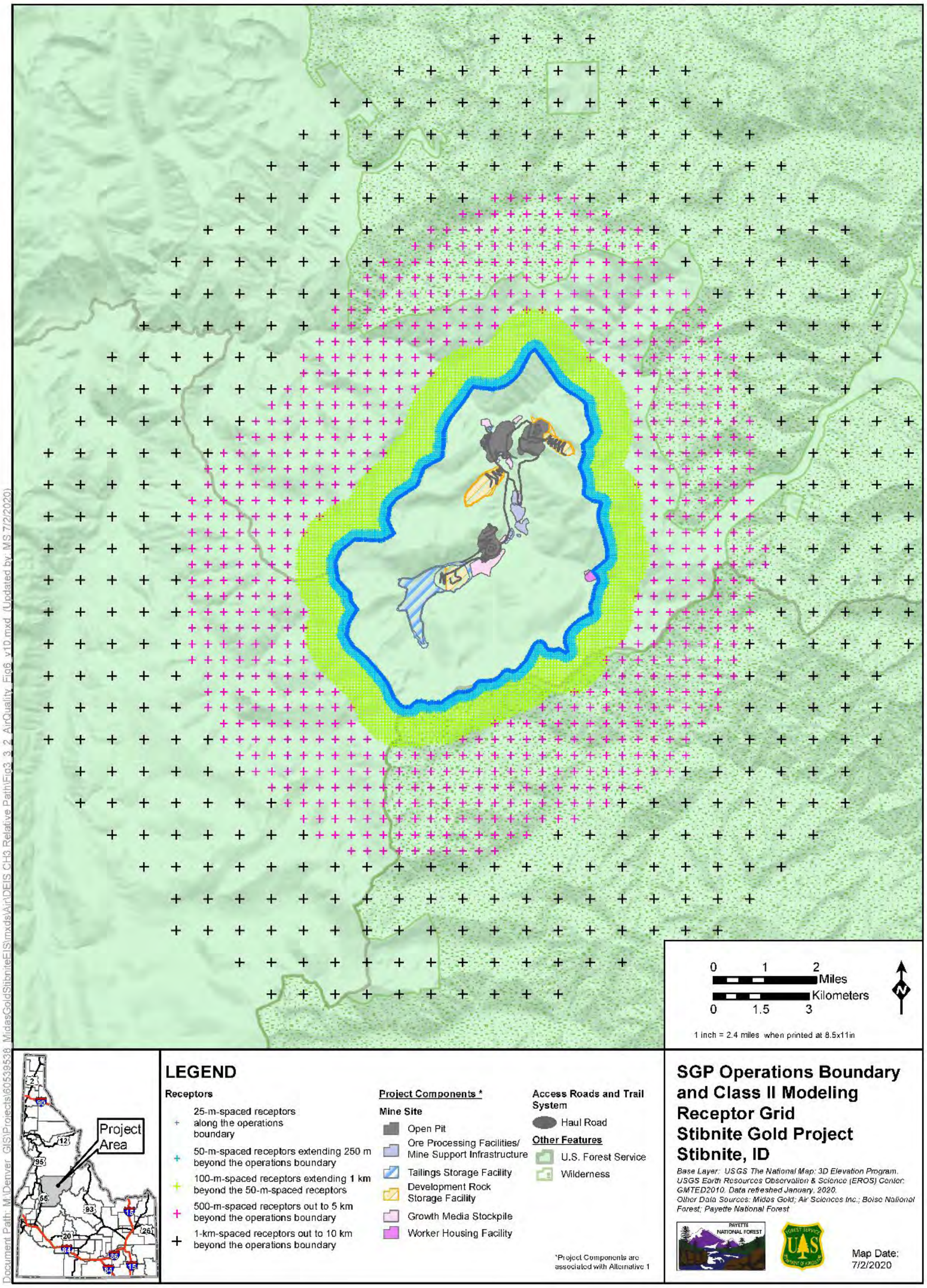

Figure Source: AECOM 2020

Figure 3.3-2 SGP Operations Area Boundary and Class II Modeling Receptor Grid Based on Alternative 1

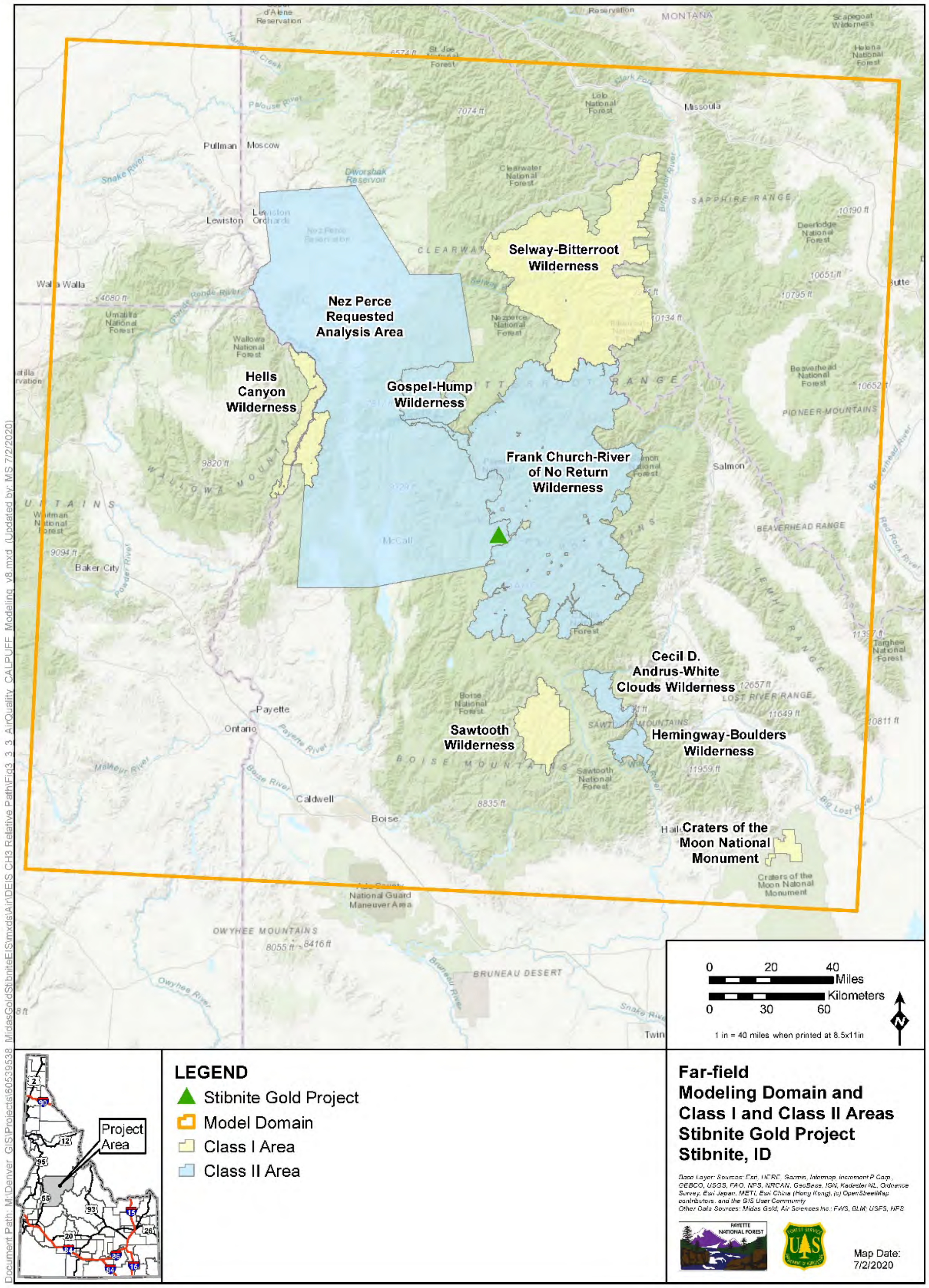

Figure Source: AECOM 2020

Figure 3.3-3 Far-field Modeling Domain and Class I and Class II Areas

Four Class II wilderness areas, also shown in **Figure 3.3-3**, were selected by the Forest Service for far-field evaluation: Frank Church River of No Return Wilderness, Gospel Hump, Hemingway-Boulders, and Cecil D. Andrus—White Clouds. The Frank Church River of No Return Wilderness area is a large wilderness adjacent to the Operations Area Boundary and extends more than 50 km from the boundary. For purposes of far-field analysis, only the portion of the Frank Church River of No Return Wilderness that is located more than 50 km from the Operations Area Boundary was considered. Also, at the request of the Nez Perce Tribe, a fifth far-field region was included. This area is identified on **Figure 3.3-3** as "Nez Perce Requested Analysis Area."

3.3.2 Relevant Laws, Regulations, Policies, and Plans

The Clean Air Act (CAA) of 1970 (42 United States Code 7401 et seq.), as amended in 1977 and 1990, regulates air emissions and protects air quality and air quality related values across the United States (U.S.). Provisions of the CAA relevant to the analysis of air quality effects are listed below:

- National Ambient Air Quality Standards (NAAQS)
- Attainment and Non-Attainment Area Designations
- New Source Review Permitting
- New Source Performance Standards (NSPS)
- Mobile Source Regulations
- Visibility and Regional Haze
- Greenhouse Gas (GHG) Reporting Rule

Certain areas also may be designated for special protection of air quality. All U.S. lands are categorized as either "Class I" or "Class II," under the CAA, which determines the level of protection from air pollution impacts provided by regulations. Mandatory federal Class I areas include International parks, wilderness areas, and national memorial parks that exceed 5,000 acres, as well as national parks that exceed 6,000 acres, which were in existence prior to August 7, 1977. All other areas were initially classified as Class II. The CAA also gives states and Tribes the ability to request re-designation from Class II to Class I status.

3.3.2.1 National Ambient Air Quality Standards

The EPA, in Title 40 CFR 50, established NAAQS for six criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) including PM less than 10 microns in diameter (PM_{10}) and PM less than 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). The NAAQS set two levels of standards for each criteria pollutant: primary standards are health- based atmospheric concentration levels, across specific averaging times, and are protective of public health; secondary standards are in comparable form, and are established to protect commercial and natural resources, and public welfare.

The following regulated air pollutants comprise the criteria pollutants covered by NAAQS:

- Ozone: Ground-level O_3 is a secondary pollutant formed in the atmosphere by a series of complex chemical reactions involving precursor pollutants nitrogen oxides (NO_X) and volatile organic compounds in the presence of sunlight. In relatively high concentrations, O_3 is a powerful oxidant capable of destroying organic matter, including human lung and airway tissue.
- Nitrogen dioxide: NO_2 can be emitted directly from combustion sources, such as fuel-fired stationary sources and vehicle exhaust. These are generally the largest source categories for nitric oxide and NO_2, collectively termed NO_X. Nitrogen dioxide also is formed in the atmosphere primarily by the rapid reaction of the colorless gas, nitric oxide, with atmospheric oxygen. Over longer-term exposures, NO_2 can irritate and damage the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections such as influenza.
- Carbon monoxide: CO is a colorless, odorless, and potentially toxic gas. It is produced by natural and anthropogenic (caused by human activity) pathways such as combustion processes. The major source of CO is incomplete combustion of carbon-containing fuels (primarily gasoline, diesel, natural gas, and coal). However, it also results from combustion of vegetation such as forest fires and agricultural burning. The potential health impact from CO is that at relatively high concentrations it diminishes the ability of blood to carry oxygen to the brain, heart, and other vital organs, which especially affects sensitive populations and those with respiratory or heart disease.
- Sulfur dioxide: SO_2 is a colorless gas with a sharp, irritating odor. It reacts with moisture in the atmosphere to produce sulfuric acid and sulfates, which contribute to acid deposition and atmospheric visibility impairment. At longer exposures to low concentrations, SO_2 causes constriction of the airways and poses a respiratory tract infection hazard to sensitive individuals, such as asthmatics and children.
- Respirable PM: PM_{10} consists of airborne PM, fine dusts, and aerosols that are 10 microns or smaller in diameter. The primary sources of PM_{10} include combustion processes, dust from paved and unpaved roads, and earthmoving construction operations. As a regulated pollutant, PM_{10} encompasses different constituents and, therefore, varying effects on health. PM_{10} particles can accumulate in the upper portion of the respiratory system, affecting the bronchial tubes, nose, and throat.
- Fine PM: $PM_{2.5}$ is a mixture of very fine particulate dusts and condensed aerosols that are 2.5 microns or smaller in aerodynamic diameter. $PM_{2.5}$ particles are emitted directly from activities such as industrial and residential combustion processes, wood burning, and from diesel- and gasoline-powered vehicles. They also are formed in the atmosphere by reactions of “precursor” gases, such as SO_2, NO_X, ammonia, and volatile organic compounds that create discrete secondary particulate. $PM_{2.5}$ can enter the deepest portions of the lungs where gas exchange occurs between the air and the blood stream, and where the lungs have no efficient mechanism for removing them. These fine

particles can be retained in the lungs permanently, which increases the risks of long-term respiratory disease, cancer, and premature death.

- While the EPA sets the NAAQS, most states, including Idaho, are responsible for attaining and maintaining the standards. The IDEQ is the regulatory agency for air pollution control for the State of Idaho. The CAA allows states to adopt their own standards if they are at least as stringent as the NAAQS. The State of Idaho has adopted the NAAQS by reference in Idaho Administration Procedures Act (IDAPA) 58.01.01(107) in lieu of settings its own standards. In addition, Idaho has adopted an ambient air quality standard for fluorides in IDAPA 58.01.01(577). While this standard is applicable, published emission information for gold mining does not address emissions of fluoride, so it is assumed that fluoride emissions from SGP sources would be negligible. **Table 3.3-1** lists the primary and secondary NAAQS.

Table 3.3-1 National Ambient Air Quality Standards

Pollutant and Averaging Time	Primary NAAQS	Secondary NAAQS	Exceedance Criteria
CO, 8-Hour	9 ppm	N/A	Not to be exceeded more than once per year
CO, 1-Hour	35 ppm	N/A	Not to be exceeded more than once per year
Lead, 3-month	0.15 μg/m^3	0.15 μg/m^3	Not to be exceeded by the rolling 3-month average
NO_2, Annual	53 ppb	53 ppb	Not to be exceeded by the average of the 1-hour concentration in a calendar year
NO_2, 1-Hour	100 ppb	N/A	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
O_3	0.070 ppm	0.070 ppm	Annual 4th highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$, Annual	12 μg/m^3	15 μg/m^3	Annual mean, averaged over 3 years
$PM_{2.5}$, 24-Hour	35 μg/m^3	35 μg/m^3	98th percentile, averaged over 3 years
PM_{10}, 24-Hour	150 μg/m^3	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
SO_2, 3-Hour	NA	0.5 ppm	Not to be exceeded more than once per year
SO_2, 1-Hour	75 ppb	N/A	99th percentile of 1-hour daily maximum concentration, averaged over 3 years

Table Source: EPA 2018a

Table Notes:

μg/m^3 = micrograms per cubic meter
CO = Carbon monoxide
m^3 = Cubic meters
N/A = Not applicable
NAAQS = National Ambient Air Quality Standards
PM = Particulate matter
NO_2 = Nitrogen dioxide
O_3 = Ozone
SO_2 = Sulfur dioxide
ppb = Parts per billion
ppm = Parts per million

The EPA determines air quality attainment status based on whether the air quality in the area consistently meets (i.e., attains) the NAAQS. Areas that persistently do not meet this standard are designated as nonattainment areas. The geographic areas considered in the air quality analysis area are in attainment of the NAAQS for all pollutants and averaging times (IDEQ 2019).

3.3.2.2 Federal Air Permitting

The New Source Review process requires facilities to undergo an EPA pre-construction review if they propose building new facilities or modifying existing facilities that would result in a “significant increase” of criteria pollutants. The New Source Review is further broken down into Major Source Permits for stationary sources that emit criteria pollutants at levels that exceed the defined thresholds for the source type and Minor Source Permits for sources that have emissions below those thresholds. In Idaho, New Source Review air permitting is administered by the IDEQ as a delegated program from EPA.

Prevention of Significant Deterioration (PSD) permitting applies to new major sources or major modifications at existing sources for specific pollutants in cases where location of the source is in attainment, or is maintaining recent attainment, with the NAAQS for that specific pollutant. For these sources, the PSD program requires an assessment of best available control technology, and expanded analysis of air quality impacts in Class I areas in 40 CFR 52. Areas surrounding the mine site are in attainment with the NAAQS. Applicability of the PSD program depends on the magnitude of annual emissions for criteria pollutants.

For new or modified major sources subject to the PSD program, ambient concentrations in Class I and Class II areas also are compared to increments that specify the maximum increase of ambient air concentrations of pollutants, or the “consumption of increment”, over the legally established baseline for an area. The analysis of increment consumption was promulgated under the CAA, and the available increment levels are specific to a given location. The allowable increment levels are more stringent in Class I areas, compared to Class II areas. It is the responsibility of the individual states, through their permitting programs, to ensure that the increments are not exceeded due to the development of new or modified facilities. While an increment analysis is required for new or modified major sources, it is recognized that new or modified minor sources also may consume increment. Because the assessment of increment consumption is part of state new source review programs, such an analysis is normally not included in air quality reviews under federal National Environmental Policy Act. A simple comparison of modeled concentrations to the increments for Class I and Class II areas was conducted as part of the air quality analysis. Disclosure of the SGP impacts in comparison to PSD increments helps to inform decision makes and the public regarding the significance of impacts to local air quality.

A Title V operating permit is required for major stationary sources under the Federal Operating Permits Program provided in CAA implementing regulations at 40 CFR 70. Whether a source meets the definition of “major,” depends on the type and amount of air pollutants the source could potentially emit on an annual basis.

A determination would be made by the IDEQ whether the SGP would require a Title V permit, due to potential emissions. This will be based on the complete air emissions inventory for stationary sources that would be submitted by Midas Gold as part of its application for an air quality permit.

3.3.2.3 Federal New Source Performance Standards

The NSPS are codified at 40 CFR 60 and are incorporated in Idaho air regulations by reference. These rules establish requirements for new, modified, or reconstructed units in specific source categories. NSPS requirements include emission limits, monitoring, reporting, and record keeping. Applicable NSPS for the SGP emission sources are:

- 40 CFR 60 Subpart A – General Provisions. Subpart A contains the general requirements applicable to all emission units subject to 40 CFR 60.
- 40 CFR 60 Subpart LL – Standards of performance for metallic mineral processing facilities. All facilities located in underground mines are exempted from the provisions of this subpart. All surface facilities at which construction or modification commenced after August 24, 1982 are subject to this subpart.
- 40 CFR 60 Subpart IIII applies to diesel-fueled reciprocating engines, which would include the compressor and generator engines included in the SGP sources.
- 40 CFR 60 Subpart OOO – Standards of Performance for Nonmetallic Mineral Processing Plants. This subpart applies to the proposed limestone processing plant in Alternative 2.

3.3.2.4 National Emission Standards for Hazardous Air Pollutants

The federal National Emission Standards for Hazardous Air Pollutants (NESHAP) rules are codified at 40 CFR 61 and 63, and are incorporated in Idaho air regulations by reference. As part of the NESHAPs program, federal maximum achievable control standards are enacted to reduce the emissions of Hazardous Air Pollutants (HAPs) from both major source and area source categories.

Consideration of NESHAP Subparts in 40 CFR 63 indicates that there are three regulations and general provisions applicable to the SGP's air emission sources:

- 40 CFR 63 Subpart A – General Provisions. Subpart A contains the general requirements applicable to all emission units subject to 40 CFR 63.
- 40 CFR 63 Subpart EEEEEEE (7E) - promulgated in February 2011, and this NESHAP applies generally to gold ore processing and production of gold-bearing products. This NESHAP is applicable to minor or "area sources" of HAP, and so would apply to the SGP emission sources. More specifically, this NESHAP applies to gold recovery and refining that use carbon processes, non-carbon processes, and mercury retorts. Therefore, the "carbon-in-pulp" process included in the Midas Gold process sequence that adsorbs dissolved gold into the carbon particles is subject to this subpart. The

regulation establishes mercury emissions limitations and work practice standards to control mercury emissions from gold production processes.

- 40 CFR 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. This subpart applies to the proposed diesel combustion engines at the SGP.
- 40 CFR 63 Subpart CCCCCC – National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities. This subpart applies to the proposed gasoline storage tanks at the SGP.

3.3.2.5 Wilderness Act

The Wilderness Act of 1964 requires that wilderness areas shall be administered to preserve their wilderness character. The agencies managing wilderness further defined wilderness character in Keeping It Wild 2 (Forest Service 2015): "Wilderness character is a holistic concept based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal experiences in natural environments generally free from the encumbrances and signs of modern society, and (3) symbolic meanings of humility, restraint, and interdependence that inspire human connection with nature." The Wilderness Act also created the National Wilderness Preservation System (NWPS) to identify and preserve designated wilderness areas (NWPS 2019a). Further, the Wilderness Act contains specific provisions for managing and protecting these pristine areas (NWPS 2019b). The Forest Service included additional wilderness areas in the air quality screening and modeling for the SGP to evaluate potential impacts on the areas' natural quality of wilderness character.

3.3.2.6 Greenhouse Gas Reporting Rule

GHGs are natural or anthropogenic gases that trap heat in the atmosphere and contribute to the greenhouse effect. In October 2009, the EPA issued the Mandatory Reporting of Greenhouse Gas Rule (MRR) in 40 CFR 98, which required reporting of GHG data and other relevant information from large sources and suppliers in the U.S. The gases covered by 40 CFR 98 are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases. Implementation of the MRR includes the greenhouse gas reporting program applicable to facilities for which actual emissions of GHG are greater than 25,000 metric tons per year. Facilities subject to the MRR are required to submit annual reports to the EPA (CFR 2016). Section 3.4, Climate Change, addresses climate change and applicability of the MRR.

3.3.2.7 Mobile Source Federal Regulations

Mobile source air pollution control requirements for gasoline and diesel on-road engines are codified in 40 CFR 80, 40 CFR 85, and 40 CFR 86. These standards are designed to reduce emissions from passenger cars, light trucks, and large passenger vehicles (including sport utility vehicles, minivans, vans, and pickup trucks) and to reduce the sulfur content of diesel and gasoline fuels. Under these provisions, the EPA initially established Tier 1 and Tier 2 emissions standards for the purpose of minimizing emissions from these sources. For the on-road vehicles that would be owned and operated by Midas Gold, the regulatory criteria indicate that EPA's Tier 2 emission standards program would apply.

Provisions for non-road diesel engines are codified in 40 CFR 89, 40 CFR 90, and 40 CFR 1039. Starting in 1996, manufacturers of non-road engines became subject to the EPA's increasingly stringent Tier 1 through Tier 4 emissions standards, depending on model year and engine size (CFR 2011). All new diesel engines have been required to meet Tier 4 standards since 2015.

EPA's mobile source regulations in 40 CFR 80 Subpart I (Motor Vehicle Diesel Fuel; Non- road, Locomotive, and Marine Diesel Fuel; and U.S. Emissions Control Area Marine Fuel) contain provisions restricting diesel fuel sulfur content for fuel used in mobile sources, in order to prevent damage to the emission control systems. These restrictions would apply to the fuels that would be used by Midas Gold, as they were phased in for highway diesel fuel starting in 2006 and for non-road diesel fuel in 2007.

3.3.2.8 Idaho Minor Source Air Permitting

The State of Idaho has enacted air quality regulations that are administered by the IDEQ. With respect to new source review permitting, IDEQ uses a Permit to Construct (PTC) program (codified in IDAPA 58.01.01.200-228) that applies to new and modified sources. In this manner, the PTC program serves to protect ambient air quality from impacts due to major and more-numerous non-major stationary emission sources.

The IDEQ requires minor source permits for new facilities that are subject to federal NSPS and/or NESHAP regulations. A determination would be made by the State of Idaho whether the SGP satisfies the requirements of the PTC program, based on demonstration of the SGP's potential emissions and controls. This would be based on the complete air emissions inventory of stationary sources that would be submitted by Midas Gold as part of its application for an air quality permit.

3.3.2.9 Idaho Visibility Protection Requirements and Regional Haze Rule

Atmospheric visibility is defined as the ability of the human eye to distinguish an object from the surrounding background. In 1980, the EPA adopted regulations requiring states to update their State Implementation Plans for protection of visibility in Class I areas in 40 CFR 51 Subpart P (40 CFR 51.300 through 40 CFR 51.307). As a federal land manager of Class I areas, the Forest Service also has affirmative responsibilities to protect air quality and air quality-related values, such as visibility, in the Class I areas.

The federal Regional Haze Rule, adopted by the State of Idaho in IDAPA 58.01.01.665-668, requires states to develop long-term regional haze State Implementation Plans for reducing human-caused pollutant emissions that contribute to visibility degradation and to establish goals aimed at improving visibility in Class I areas. Sources of haze-causing pollutants include emissions from industrial sources, tailpipes, agricultural equipment and practices; and from natural sources such as volcanic emissions, windblown dust, and smoke from wildfires.

Haze-forming pollution can travel thousands of miles. According to IDEQ, regional haze in Idaho's natural parks and scenic areas is attributable to a variety of natural and human source of air pollution and is greatly impacted by the effects of climate, such as drought, increased wildfires, and reduced precipitation (IDEQ 2017).

3.3.2.10 Idaho Toxic Air Pollutant Program

The State of Idaho's Toxic Air Pollutant Program is a stand-alone risk-based program that regulates approximately 350 pollutants determined by their nature to be toxic to human or animal life or vegetation. The program prohibits emissions of these pollutants in amounts that would injure or unreasonably affect human or animal life or vegetation. Toxic Air Pollutant emissions from industrial sources are compared to screening levels and limited by acceptable ambient concentrations for carcinogenic (i.e., having the potential to cause cancer) and non-carcinogenic pollutants. An air impact modeling analysis is required for projects having Toxic Air Pollutant emissions that exceed screening emission levels provided in IDAPA 58.01.01.585 for non- -carcinogens, and IDAPA 58.01.01.586 for carcinogens. The modeling analysis must show that the acceptable ambient concentrations for non-carcinogens are not exceeded on a 24-hour average basis, and on a longer- term average for carcinogens. A determination will be made by IDEQ whether the SGP satisfies the requirements of the Toxic Air Pollutant program, based on the complete air emissions inventory submitted in Midas Gold's application to IDEQ for a permit to construct. The SGP is expected to be required to provide compliance demonstration for conformance to the acceptable ambient concentrations as part of the state permitting process.

3.3.2.11 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for air quality and include various objectives, guidelines, and standards for this purpose.

3.3.3 Existing Conditions

The air quality in a given location is characterized by a number of properties that can be physically monitored and evaluated. The existing conditions that may be affected by the SGP include ambient air quality in comparison to the NAAQS, visibility as impacted by regional haze and visible plumes emitted from mine activities, and current rates of atmospheric deposition of mercury, nitrogen, and sulfur compounds. The description of the affected environment addresses these issues and several other parameters that pertain to regional air quality.

3.3.3.1 Criteria Air Pollutants

For mine site-specific baseline concentrations, Midas Gold collected 20 months (November 2013 to June 2015) of PM_{10} and $PM_{2.5}$ air concentration data at the approved Stibnite monitoring station (IDEQ 2013). The Stibnite monitor is in the same airshed as the mine site; characterized as mountain valley terrain with little or no industry. Additionally, this mine site particulate monitor is located within the near-field analysis area and was deemed by IDEQ to be representative of background conditions in the locale. The IDEQ formally approved the Monitoring Protocol and Quality Assurance Project Plan in December 2013 (IDEQ 2013). Both the meteorological and air quality monitoring began in November 2013 (Trinity Consultants 2017). After reviewing the data and associated quality control procedures, IDEQ concluded that the calendar year 2014 data for PM_{10} and $PM_{2.5}$ data collected at the Stibnite monitoring station satisfied the applicable regulatory requirements and approved the data as representative for analysis (IDEQ 2015).

For the ambient air NAAQS demonstration, IDEQ identified the source for gaseous pollutant background data as the Northwest (NW) AIRQUEST database for years 2014-2017 (Washington State University 2018) to be used in conjunction with particulate matter data collected at the Stibnite monitoring station. **Table 3.3-2** displays these data along with the applicable NAAQS. The areas considered in the analysis of air quality impacts are in attainment of the NAAQS for all pollutants and averaging times (IDEQ 2019).

Table 3.3-2 Ambient Air Data – Midas Gold and NW Airquest Consortium Design Values

Pollutant and Averaging Time	Monitored Value and Units	NAAQS	Source and Period
PM_{10}, 24-Hour	37 μg/m³ [1]	150 μg/m³	Onsite monitor 1/1/14-12/31/14
$PM_{2.5}$, Annual	3.5 μg/m³ [6]	12 μg/m³	J Onsite monitor 1/1/14-12/31/14
$PM_{2.5}$, 24-Hour	15 μg/m³ [3]	35 μg/m³	Onsite monitor 1/1/14-12/31/14
SO_2, 3-Hour (Secondary)	6.4 ppb [1]	500 ppb	NW Airquest Consortium 7/1/14-6/30/17
SO_2, 1-Hour	4.7 ppb [4]	75 ppb	NW Airquest Consortium 7/1/14-6/30/17
CO, 8-Hour	0.97 ppm [1]	9 ppm	NW Airquest Consortium 7/1/14-6/30/17
CO, 1-Hour	1.52 ppm [1]	35 ppm	NW Airquest Consortium 7/1/14-6/30/17
NO_2, Annual	0.5 ppb [2]	53 ppb	NW Airquest Consortium 7/1/14-6/30/17
NO_2, 1-Hour	2.3 ppb [5]	100 ppb	NW Airquest Consortium 7/1/14-6/30/17
Ozone (O_3), 8-Hour	60 ppb [4]	70 ppb	NW Airquest Consortium 7/1/14-6/30/17

Table Source: Air Sciences 2018; EPA 2018d; NW AIRQUEST 2018

Table Notes:

1 Maximum 2nd-high value for the data collection period.

2 Annual mean value for the data collection period.

3 98th-percentile for the data collection period.

4 Average of the 99th-percentile daily maximum 1-hour values for the data collection period.

5 Average of the 98th-percentile daily maximum 1-hour values for the data collection period.

6 Weighted average of quarterly means for the data collection period.

CO = Carbon monoxide
m^3 = Cubic meters
μg/m^3 = micrograms per cubic meter
NO_2 = Nitrogen dioxide
N/A = Not applicable
NAAQS = National Ambient Air Quality Standard
O_3 = Ozone
PM = Particulate matter
ppm = Parts per million
ppb = Parts per billion
SO_2 = Sulfur dioxide

3.3.3.2 Hazardous Air Pollutants

HAPs, as defined in Section 112 of the CAA, are a specific roster of pollutants that are known or suspected to cause cancer, other serious health effects, or adverse environmental effects. In addition to exposure from breathing HAPs, some HAPs can be transported from the source and deposited onto soils or into surface waters, where they are taken up by plants and/or ingested by animals. Like humans, animals may experience health problems if exposed to sufficient quantities of HAPs over time.

There are no permitted sources of HAP emissions in the vicinity of the SGP area. One source, the Tamarack Mill, LLC is 75 km away, and reported minor source level emissions of 5.9 tons per year of HAP in 2014 (Trinity Consultants 2017). Due to absence of permitted HAP emission sources in the air quality analysis area, it can be assumed that baseline concentrations of HAPs are relatively low as compared with more industrialized or heavily populated areas.

3.3.3.3 Ozone

For purposes of identifying a baseline value for NAAQS assessment of O_3 impacts due to SGP sources, the IDEQ selected the baseline value from the NW AIRQUEST database for years 2014 through 2017 (Washington State University 2018).

The National Park Service has been operating a continuous O_3 monitor at CRMO from 1992 to present. This monitor is the only O_3 data source in the region that is not located in an urban area, therefore, it is likely representative of conditions near the mine site and surrounding rural area. The highest 1-hour maximum O_3 concentration recorded at the monitor was 91 ppb recorded in July 1996 and again in August 2008. The highest O_3 concentration measured at CRMO that is comparable to the 8-hour average NAAQS, (i.e., annual fourth-highest daily maximum 8-hour average) was 67 ppb which occurred in 2004, 2007, and 2008. The annual trend of the fourth-highest 8-hour average for recent years is shown in **Table 3.3-3**.

Table 3.3-3 Annual Ozone Concentration Values for Comparison to 8-Hour NAAQS Criteria Values – Craters of the Moon National Monument, 2007-2015

Annual O_3 Conc. for NAAQS Comparison [1]	2007	2008	2009	2010	2011	2012	2013	2014	2015
8-hour O_3 Conc.(ppb)[2]	67	67	58	62	63	65	60	62	61

Table Source: National Park Service 2018

Table Notes:

1 The annual 4th highest 8-hour average averaged over a 3-year period is the NAAQS averaging criteria; these data are annual values, without rolling 3-year averaging.

2 These values can be compared to the 2015 8-hour average O_3 NAAQS of 70 ppb.

3.3.3.4 Air Quality Related Values

Air Quality Related Values (AQRVs) are resources sensitive to air quality and include a wide array of resources including, but not limited to, vegetation, soils, water, fish, wildlife, and visibility. Visibility may be affected by impairment due to plume blight or increase in regional haze levels. Plant growth and survival may be adversely affected due to increased ozone concentrations. Deposition of acidic air pollutants may cause episodic or chronic acidification of surface waters and may alter soil chemistry. Elevated deposition of nitrogen or phosphorus can drive species composition changes in both aquatic and terrestrial environments and can change growth and survival rates of plants. Mercury deposition can impact aquatic and riparian dependent species and can bioaccumulate causing health risks to humans and other species.

The CAA gives federal land managers the affirmative responsibility to protect against degradation of air quality and AQRVs in Class I areas. There are several Class I areas within a 300-km radius of the mine site which were considered for AQRV impact assessments. The nearest Class I areas are SAWT (approximately 80 km south-southeast of the SGP Operations

Area Boundary) and Selway-Bitterroot Wilderness (approximately 90 km northeast of the SGP Operations Area Boundary). The Class I areas within a 300-km radius of the SGP Operations Area Boundary are shown in **Figure 3.3-1**.

The monitoring stations in the far-field analysis area that provide representative background data are listed in **Table 3.3-4**, and the station locations are mapped in **Figure 3.3-4**. Several sources of monitored data are discussed in more detail in this section. The Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring network stations measure chemical constituents that contribute to regional haze and visibility impairment. The National Trends Network (NTN), operated by the National Atmospheric Deposition Program (NADP) provides data on wet atmospheric deposition. The Clean Air Status and Trends Network (CASTNET), provides information on dry atmospheric deposition, including sulfur and nitrogen compounds, as well as ozone. The Mercury Deposition Network (MDN), also operated by NADP, monitors the atmospheric mercury concentration in wet deposition.

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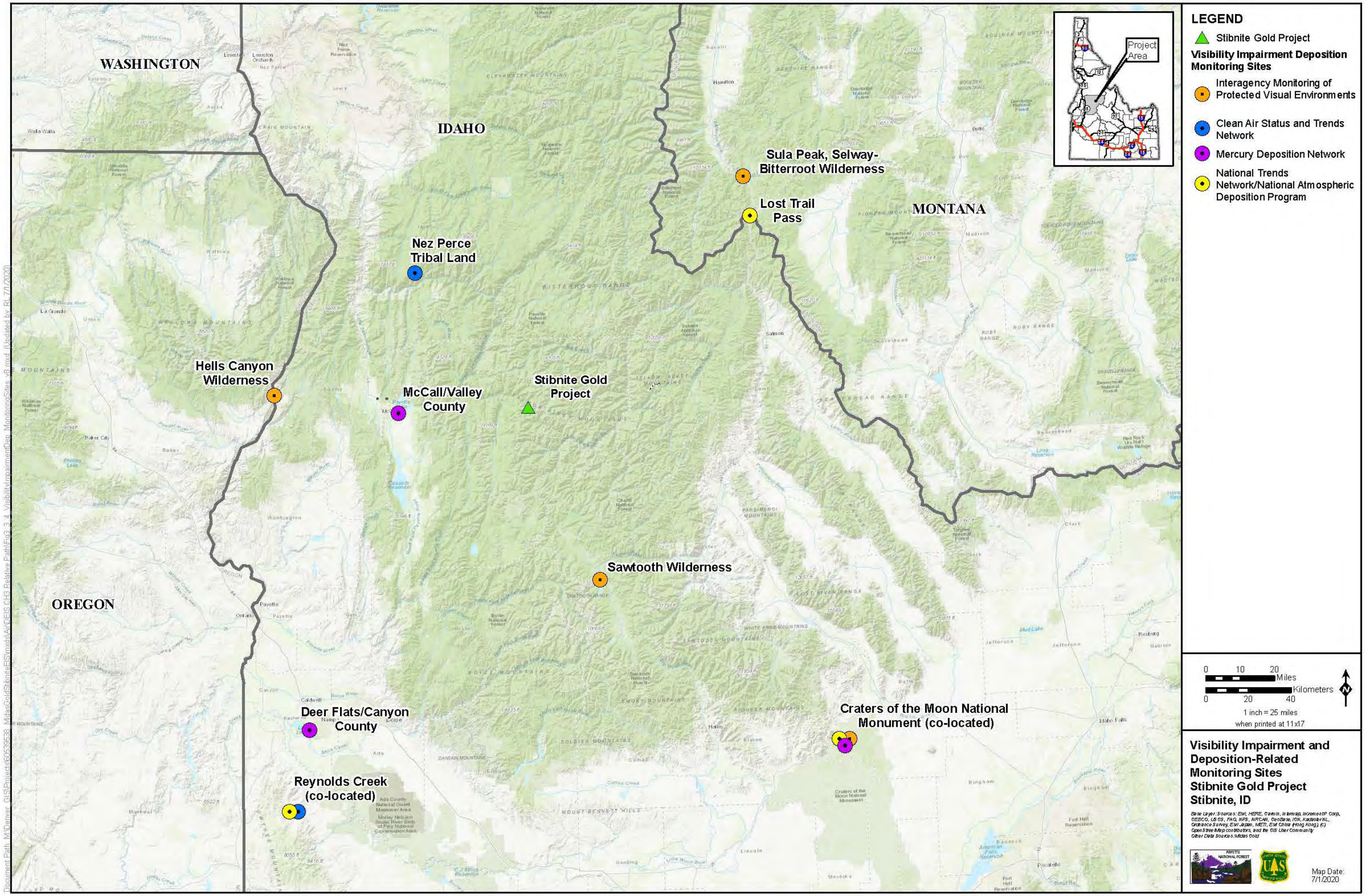

Figure Source: AECOM 2020

Figure 3.3-4 Visibility Impairment and Deposition-Related Monitoring Sites

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Table 3.3-4 Visibility Impairment and Deposition-Related Monitoring Sites

Site ID Code	Network	State	Location/ Site Name	Monitored Parameters	Distance and Direction from Mine Site to Monitor (mi)	Monitor Elevation (feet)	North Latitude (Decimal Deg.)	West Longitude (Decimal Deg.)	Monitoring Period
CRMO1	IMPROVE	Idaho	Craters of the Moon National Monument	Haze/Visibility Impairment	132, southeast	5,964	43.4605	-113.5550	5/1992 to present
HECA1	IMPROVE	Idaho/ Oregon	Hells Canyon Wilderness	Haze/Visibility Impairment	75, west	2,149	44.9702	-116.8437	8/2000 to present
SAWT1	IMPROVE	Idaho	Sawtooth Wilderness	Haze/Visibility Impairment	52, south-southeast	6,530	44.1705	-114.9271	1/1994 to present
SULA1	IMPROVE	Montana	Sula Peak, Selway-Bitterroot Wilderness	Haze/Visibility Impairment	90, northeast	6,220	45.8598	-114.0000	8/1994 to present
RCK263	CASTNET	Idaho	Reynolds Creek	Dry Deposition	165, south-southwest	3,930	43.2105	-116.7510	9/1990 to 12/2016
NPT006	CASTNET	Idaho	Nez Perce Tribal Land	Dry Deposition	51 north-northwest	3,100	46.2758	-116.0216	12/2002 to present
ID03	NTN	Idaho	Craters of the Moon National Monument	Wet Deposition	132, southeast	5,929	43.4605	-113.5551	8/1980 to present
ID11	NTN	Idaho	Reynolds Creek	Wet Deposition	165, south-southwest	3,937	43.2049	-116.7500	11/1983 to present
MT97	NTN	Montana	Lost Trail Pass	Wet Deposition	88, northeast	7,877	45.6920	-113.9680	9/1990 to present
ID03	MDN	Idaho	Craters of the Moon National Monument	Mercury Deposition	132, southeast	5,928	43.4605	-113.5551	10/2006 to 12/2010
ID98	MDN	Idaho	Deer Flats/ Canyon County	Mercury Deposition	182, southwest	2,539	43.5528	-116.6436	3/2008 to 6/2010
ID99	MDN	Idaho	McCall / Valley County	Mercury Deposition	61, west	5,013	44.8913	-116.1047	11/2007 to 6/2010

Table Source: EPA 2018b; IMPROVE 2018; NADP 2018

Table Notes:

CASTNET = Clean Air Status and Trends Network

IMPROVE = Interagency Monitoring of Protected Visual Environments

MDN = Mercury Deposition Network

NTN = National Trends Network

3.3.3.4.1 VISIBILITY

The CAA sets specific goals for protecting Class I areas from human-caused visibility impacts. Scattering of light by aerosols is the main process that limits visibility in the troposphere (ground level to approximately 10 km) degrading the clarity and color of what can be seen. Airborne particles are naturally occurring (biogenic) and include seeds, pollen, spores, fragments of plants and animals, sea salt, dust, and smoke. They also are generated from anthropogenic sources, which include dust from roads, wind erosion of tilled land, biomass burning, fuel combustion, and industrial processes. In addition, emissions of sulfur, nitrogen, and carbon compounds, which are emitted from industrial sources burning fossil fuels, or from natural sources (e.g., wildfire or dust storms) can be precursors of condensed aerosol particles. In Class I wilderness areas and parks, the Regional Haze Rule requires states to address human-caused sources of air pollution degrading visibility on a regional scale. States use the “impairment” metric to factor out natural sources, such as wildfire smoke, and international contributions outside their control, in tracking their progress in improving visibility in the Class I areas.

One unit used to quantify visibility deterioration is the “visual range,” which is a measurable parameter of atmospheric clarity at a specific monitoring location. A shorter visual range corresponds to more impaired long-range visibility through the atmosphere. Visibility has generally improved in Class I areas across the country, in part due to mandated sulfur restrictions on fuels, and controls on industrial sources of air pollution. Average monthly visual range values in the four Class I areas included in the far-field analysis area are between 223 and 278 km, with significant seasonal fluctuation (Air Sciences 2018; Federal Land Managers' Air Quality Related Values Work Group 2010).

IMPROVE is a cooperative visibility monitoring effort managed by the EPA, with assistance from multiple U.S. agencies, state agencies, Indian tribes, and associated members in Canada and South Korea. The IMPROVE program measures current and long-term trends in visibility by monitoring, on 3-day intervals, the pollutants that contribute to reduction in visual range. Historic visibility parameters are presented in **Table 3.3-5** for the four IMPROVE stations in Class I areas in the far-field analysis area. The IMPROVE network is designed so that some monitoring sites are used to represent multiple Class I areas in a region.

The visibility data in **Table 3.3-5** illustrate how observed impairment can vary seasonally and with local conditions in a given locale. Two different measures of impairment are listed. The “most impaired days” represent the portion of days that exhibit the highest 20 percent of observed visibility impairment and reflects only anthropogenic contributions to haze. Another visibility metric, the “monthly average visual range” includes effects of anthropogenic and natural (e.g., wildfire) contributions to haze, and a higher visual range reflects better clarity. The distribution of most impaired days at the Sawtooth (SAWT1) and Selway-Bitterroot (SULA1) wilderness areas tend to have a greater portion of the most impaired days during the warmer summer months. In contrast, the most impaired days occur more frequently during the winter months at Craters of the Moon National Monument (CRMO1) and Hells Canyon Wilderness (HECA1).

Table 3.3-5 Historic Visibility Impairment Parameters - Four Class I Area IMPROVE Sites

Month	CRMO1 Percent of Observed Most Impaired Days	CRMO1 Monthly Avg. Visual Range (km)	HECA1 Percent of Observed Most Impaired Days	HECA1 Monthly Avg. Visual Range (km)	SAWT1 Percent of Observed Most Impaired Days	SAWT1 Monthly Avg. Visual Range (km)	SULA1 Percent of Observed Most Impaired Days	SULA1 Monthly Avg. Visual Range (km)
Jan	22.05	245	26.36	224	6.93	259	2.79	251
Feb	16.01	248	14.33	229	2.13	263	2.79	256
Mar	8.14	252	3.72	234	2.93	269	6.69	261
Apr	6.30	255	5.73	237	8.53	272	14.21	264
May	4.72	255	3.15	238	11.47	272	13.09	265
June	0.79	257	0.29	239	10.40	274	10.86	266
July	0.00	261	1.72	242	12.27	278	9.75	270
Aug	0.26	261	1.43	243	8.27	278	3.62	271
Sept	0.26	259	1.43	241	8.00	277	8.91	268
Oct	2.89	255	6.88	235	12.00	273	13.09	262
Nov	17.32	248	15.47	226	10.93	263	10.58	253
Dec	21.26	246	19.48	223	6.13	259	3.62	251

Table Source: Air Sciences 2018; Federal Land Managers 2018; IMPROVE 2018

Table Notes:

CRMO1 = Craters of the Moon National Monument, Monitored Years 2002 -17.

HECA1 = Hells Canyon Wilderness, Monitored Years 2000 – 17.

IMPROVE = Interagency Monitoring of Protected Visual Environments.

SAWT1 = Sawtooth Wilderness, Monitored Years 1994 – 2017.

SULA1 = Sula Peak, Selway-Bitterroot Wilderness, Monitored Years 1994 – 2017.

Plume visibility is a transient condition that is caused by a source or combination of sources and is the presence of a plume that is visible to an observer some distance from the source.

Assessment of plume visibility is a means to quantify the ability of a viewer to discern a visible plume and is usually evaluated for an observer at the closest point on the boundary of a Class I area of concern. Plume blight occurs when a coherent plume from a source is perceptible against a viewing background (e.g., the sky, or a terrain feature such as a mountain) to a casual observer. The primary parameters of plume blight are the change in visible contrast and color contrast between a plume and background.

3.3.3.4.2 ATMOSPHERIC DEPOSITION

There are two types of deposition that can affect AQRVs: 1) wet deposition, which involves the scavenging of particles and gases in the air by clouds and precipitation; and 2) dry deposition, which involves the direct collection of gases and particles in the air by vegetation and solids and liquid surfaces (Wallace and Hobbs 2006). Atmospheric deposition may be due to distant sources or local sources of pollution.

As described in this section, data for the existing conditions at the monitoring stations nearest the SGP area indicate that both wet and dry nitrogen deposition either show no clear trend or are trending higher. Nationwide, it has been reported that deposition of oxidized nitrogen species has declined between 2006 and 2016, which may reflect improved NO_X emission control technologies for vehicles and power plants. However, over the same period, deposition rates of reduced forms of nitrogen, such as ammonia, have increased or remained unchanged (NADP 2019b). The data presented in this section show that no clear trend is evident in wet or dry sulfur species deposition between 2005 and 2015 at the monitoring sites closest to the SGP area.

Two complementary monitoring networks that collect deposition data are described in this section: CASTNET and NTN, which collect data related to dry and wet deposition, respectively. Total deposition estimates are provided nationwide by NADP’s Total Deposition Science Committee. They use a hybrid approach combining ambient measurements from CASTNET, NTN, and other air concentration monitoring data with model output to provide gridded estimates of total deposition (NADP 2019a; Schwede and Lear 2014). Nearly all CASNTET sites are co-located or are near a corresponding NTN site, which together provide the data needed to track temporal and spatial trends in total deposition.

Deposition of nitrogen and sulfur compounds impact the environment through several pathways. In the atmosphere, NO_X reacts with moisture and oxygen to form nitric acid, nitrates, and nitrous oxide, while SO_2 reacts to form sulfuric acid, sulfates, and sulfites, which can be transported to the surface by wet deposition. Nitrogen and sulfur compounds formed in the atmosphere are conveyed by dry and wet deposition and can affect soils, water and biota far from the origination of the precursor emissions. Excessive nitrogen deposition can cause reduction in plant biodiversity and eutrophication (excessive plant and algae growth) in surface waters. This has the effect of reducing the oxygen content of the water, and therefore reduces the population of animal life the water can sustain.

Of somewhat less concern in the Pacific Northwest is acid deposition, which occurs when SO_2, NO_X, and ammonia in the atmosphere react to form sulfuric acid, nitric acid, and ammonium. These compounds can enter surface waters, primarily through wet deposition. These pollutants originate from anthropogenic sources (e.g., burning of fossil fuels in power plants and motor vehicles, and agricultural practices), and to a lesser degree from biogenic sources (e.g., forest fires and volcanoes).

3.3.3.4.2.1 National Trends Network

The NTN provides a nationwide historic record of precipitation chemistry that is reflected in wet deposition rates to soil and surface water. The NTN is part of the NADP that operates several atmospheric monitoring programs. NTN sites are typically located away from urban areas and large point sources of pollution, and many stations are in Class I areas. While stations cannot be established and operated in protected wilderness areas, NTN sites are in many cases located near, or are considered representative of, nearby wilderness area deposition conditions at similar elevations. Each monitoring site measures the quantity of precipitation, and automatically captures samples only during precipitation events. Samples are retrieved from the field on a weekly interval, and analyzed for calcium, magnesium, potassium, sodium, ammonium, nitrate, total nitrogen species, chloride, sulfate, and free acidity (as H^+) (NADP 2019a). Wet deposition data is expressed in units of kilograms per hectare per year (kg/ha-yr)[3].

Annual data for three NTN sites closest to the mine site is presented in **Tables 3.3-6a** through **3.3-6c**. These three sites are located at the CRMO (213 km distant, southeast) Reynolds Creek (264 km distant, south-southwest), and Lost Trail Pass (142 km distant, northeast). Trends in the wet deposition rates of the primary nitrogen and sulfur species (nitrate [NO_3], ammonium [NH_4], and sulfate [SO_4]) are plotted in **Figures 3.3-5a** through **3.3-5c** for the three NTN sites. These trends show the wide variability in annual wet deposition rates in the region, with no clear long- term trend.

3.3.3.4.2.2 Clean Air Status and Trends Network Data

CASTNET is a long-term, dry deposition national monitoring network managed by EPA. The CASTNET sites measure nitrogen and sulfur species, chloride, and base cations (i.e., a positively charged ion) that are used to calculate dry deposition rates. The network was established under the 1990 CAA Amendments to provide accountability for emission reduction programs by reporting trends in pollutant concentrations and acidic deposition (EPA 2018b). **Table 3.3-7** shows dry nitrogen compound and dry sulfur compound deposition rates at the two CASTNET monitoring sites closest to the mine site, and located in Idaho. These are stations on Nez Perce Tribal Land (82 km distant, north-northwest, and at Reynolds Creek (264 km distant,

[3] 1 kilogram = 2.2lbs; 1 hectare = 2.5 acres.

south-southwest). Like wet deposition, dry deposition is typically expressed in units of kg/ha-yr. **Figure 3.3-6** illustrates the trends in annual dry deposition rates at these sites, with dry deposition of sulfur species generally higher than nitrogen species.

3.3.3.4.2.3 Mercury Deposition Network

Inorganic mercury (Hg) in gaseous and particle-bound forms and mercury oxide are emitted from many mining operations and fossil fuel combustion sources, most notably coal-fired electrical-generating units. Each form has specific physical and chemical properties that determine how far it travels in the atmosphere before depositing to the landscape.

Atmospheric deposition of mercury is of particular concern where the potential exists for transfer to riparian areas and/or surface waters through precipitation and runoff. Although gaseous oxidized Hg and particle-bound Hg deposition are prevalent, all forms of Hg may deposit to local or regional watersheds (Zhang 2009). National Hg emissions from domestic anthropogenic sources declined from about 63 tons in 2008 to about 55 tons in 2014, the latest data year available in the EPA National Emissions Inventory (EPA 2017). More than 75 percent of this decline (5.9 tons per year) can be attributed to reductions in Hg emissions from fossil-fueled electric generation plants (EPA 2017). Once deposited in a body of water, inorganic forms of mercury are converted to a chemical form (methyl mercury) that can become concentrated in fish and can harm the health of individuals who consume these fish, particularly children. In relatively arid regions, such as Idaho, dry Hg deposition may be a larger contributor to atmospheric deposition of mercury compared to wet deposition.

Annual averages of sampling data are available from the MDN in the region corresponding to the far field analysis area. Three MDN sites have been located at CRMO, Deer Flats (294 km distant, south-southwest), and McCall, Idaho (59.5 km distant, west). The most recent measurements were between 2007 and 2010 but are provided in **Table 3.3-8** to serve as an estimate of historical Hg deposition in the region surrounding the SGP area. Total Hg deposition in precipitation (organic + inorganic) is calculated for the MDN in units of micrograms per square meter per year ($\mu g/m^2$-yr) based on measured mass of Hg deposited over a known sample area (NADP 2018).

Table 3.3-6 NTN Speciated Wet Deposition, Annual Average (Table 3.3-6a – Table 3.3-6c)

Table 3.3-6a NTN Speciated Wet Deposition, Annual Average - Craters of the Moon National Monument (Site ID03)

Year	Ca (kg/ha-yr)	Mg (kg/ha-yr)	K (kg/ha-yr)	Na (kg/ha-yr)	NH_4 (kg/ha-yr)	NO_3 (kg/ha-yr)	Total N (kg/ha-yr)	Cl^- (kg/ha-yr)	SO_4 (kg/ha-yr)	H+ (kg/ha-yr)
2006	0.336	0.034	0.054	0.092	0.839	1.485	0.987	0.149	0.899	0.005
2007	0.266	0.027	0.035	0.087	0.605	1.223	0.746	0.112	0.618	0.004
2008	0.348	0.038	0.038	0.086	0.752	1.534	0.931	0.167	0.838	0.011
2009	1.81	0.141	0.18	2.768	1.114	1.872	1.289	2.271	2.955	0.007
2010	0.506	0.047	0.04	0.209	0.759	1.664	0.966	0.253	0.87	0.012
2011	0.298	0.035	0.038	0.092	0.667	1.089	0.764	0.148	0.676	0.004
2012	2.084	0.175	0.14	0.608	0.72	1.204	0.831	0.806	0.986	0.003
2013	0.596	0.063	0.072	0.181	0.872	1.517	1.02	0.256	0.809	0.002
2014	0.413	0.048	0.075	0.13	0.959	1.348	1.049	0.214	0.715	0.006
2015	1.022	0.09	0.157	0.913	1.279	1.979	1.441	0.72	1.825	0.006
2016	2.141	0.171	0.265	1.454	1.324	1.858	1.449	1.531	1.32	0.010
Mean	**0.89**	**0.079**	**0.099**	**0.60**	**0.90**	**1.52**	**1.04**	**0.60**	**1.14**	**0.01**
Median	**0.51**	**0.048**	**0.072**	**0.18**	**0.84**	**1.52**	**0.99**	**0.25**	**0.87**	**0.01**

Table Source: NADP 2019a

Table Notes:

kg/ha-yr = kilograms per hectare per year

(1 kg = 2.2 lbs.; 1 hectare = 2.5 acres)

Ca = calcium
Na = sodium
Cl- = chloride
NH_4 = ammonium
H+ = free acidity
NO_3 = nitrate
K = potassium
SO_4 = sulfate
Mg = magnesium
N = nitrogen

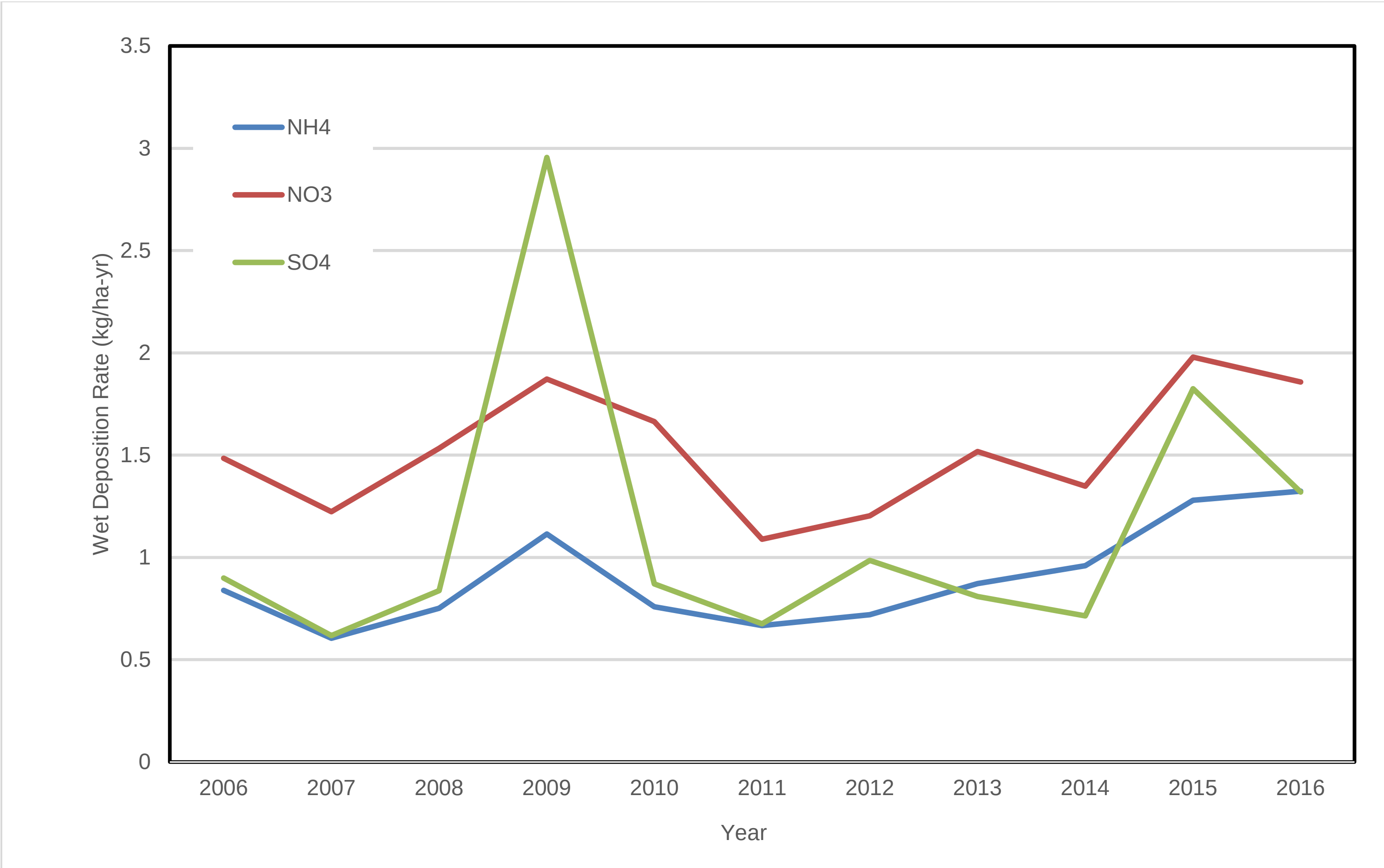

Figure Source: NADP 2019a

Figure Notes:

kg/ha-yr = kilograms per hectare per year; NH_4 = ammonium; NO_3 = nitrate; SO_4 = sulfate

Figure 3.3-5a Trends in Wet Deposition Rates – Craters of the Moon National Monument, 2006-2016

Table 3.3-6b NTN Spectated Wet Deposition, Annual Average - Reynolds Creek (Site ID11)

Year	Ca (kg/ha-yr)	Mg (kg/ha-yr)	K (kg/ha-yr)	Na (kg/ha-yr)	NH_4 (kg/ha-yr)	NO_3 (kg/ha-yr)	Total N (kg/ha-yr)	Cl^- (kg/ha-yr)	SO_4 (kg/ha-yr)	H+ (kg/ha-yr)
2006	0.323	0.033	0.042	0.207	0.332	0.855	0.451	0.148	0.615	0.005
2007	0.315	0.033	0.05	0.214	0.674	1.021	0.754	0.157	0.704	0.005
2008	0.145	0.017	0.041	0.197	0.434	0.653	0.485	0.087	0.534	0.004
2009	0.51	0.063	0.118	0.584	0.802	1.188	0.891	0.237	1.284	0.004
2010	0.591	0.066	0.09	0.878	0.912	1.476	1.042	0.391	1.811	0.007
2011	0.297	0.035	0.056	0.402	0.481	0.762	0.546	0.3	0.627	0.006
2012	0.87	0.084	0.119	1.756	0.507	0.895	0.596	0.482	1.953	0.005
2013	0.6	0.072	0.118	0.321	1.347	2.257	1.556	0.244	1.357	0.006
2014	0.466	0.07	0.15	0.32	0.979	2.031	1.22	0.29	1.049	0.005
2015	0.809	0.078	0.13	1.519	1.061	1.399	1.141	0.515	1.998	0.003
2016	0.487	0.047	0.086	0.704	0.562	0.956	0.653	0.297	1.019	0.003
Mean	**0.49**	**0.054**	**0.091**	**0.65**	**0.74**	**1.23**	**0.85**	**0.29**	**1.18**	**0.005**
Median	**0.49**	**0.063**	**0.090**	**0.40**	**0.67**	**1.02**	**0.75**	**0.29**	**1.05**	**0.01**

Table Source: NADP 2019a

Table Notes:

kg/ha-yr = kilograms per hectare per year

(1 kg = 2.2 lbs.; 1 hectare = 2.5 acres)

Ca = calcium | Na = sodium

Cl- = chloride | NH_4 = ammonium

H+ = free acidity | NO_3 = nitrate

K = potassium | SO_4 = sulfate

Mg = magnesium

N = nitrogen

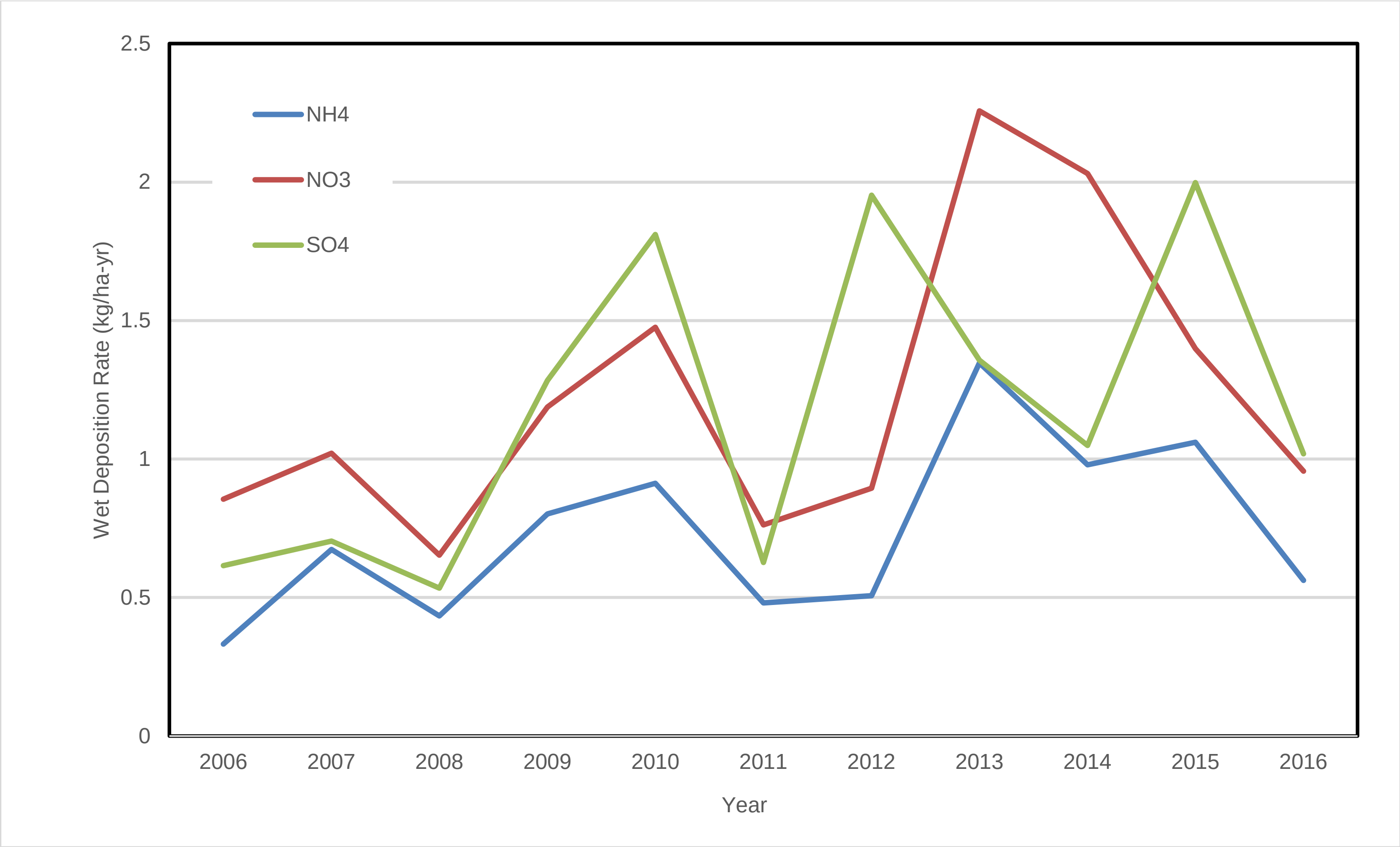

Figure Source: NADP 2019a

Figure Notes:

kg/ha-yr = kilograms per hectare per year; NH_4 = ammonium; NO_3 = nitrate; SO_4 = sulfate

Figure 3.3-5b Trends in Wet Deposition Rates – Reynolds Creek, 2006-2016

Table 3.3-6c NTN Spectated Wet Deposition, Annual Average - Lost Trail Pass (Site MT97)

Year	Ca (kg/ha-yr)	Mg (kg/ha-yr)	K (kg/ha-yr)	Na (kg/ha-yr)	NH_4 (kg/ha-yr)	NO_3 (kg/ha-yr)	Total N (kg/ha-yr)	Cl^- (kg/ha-yr)	SO_4 (kg/ha-yr)	H+ (kg/ha-yr)
2006	0.628	0.080	0.329	0.309	0.737	3.018	1.255	0.528	2.301	0.050
2007	0.378	0.048	0.078	0.174	0.523	1.638	0.777	0.252	1.318	0.035
2008	0.422	0.051	0.103	0.144	0.484	1.914	0.808	0.247	1.503	0.039
2009	0.481	0.059	0.226	0.383	0.501	2.356	0.921	0.52	2.003	0.051
2010	0.382	0.048	0.096	0.22	0.402	1.778	0.714	0.258	1.233	0.041
2011	1.15	0.114	0.125	0.41	0.751	1.89	1.011	0.569	1.776	0.042
2012	0.806	0.086	0.108	0.441	0.613	1.763	0.874	0.441	1.408	0.034
2013	0.338	0.047	0.15	0.197	0.648	1.597	0.864	0.357	1.146	0.033
2014	0.452	0.068	0.164	0.233	0.725	2.066	1.03	0.315	1.341	0.056
2015	0.37	0.047	0.133	0.645	0.768	1.508	0.938	0.313	1.015	0.038
2016	4.02	1.306	0.354	1.679	0.69	1.399	0.852	0.802	1.781	0.034
Mean	**0.86**	**0.18**	**0.17**	**0.44**	**0.62**	**1.90**	**0.91**	**0.42**	**1.53**	**0.041**
Median	**0.45**	**0.06**	**0.13**	**0.31**	**0.65**	**1.78**	**0.87**	**0.36**	**1.41**	**0.039**

Table Source: NADP 2019a

Table Notes:

kg/ha-yr = kilograms per hectare per year

(1 kg = 2.2 lbs.; 1 hectare = 2.5 acres)

Ca = calcium

Cl- = chloride

H+ = free acidity

K = potassium

Mg = magnesium

N = nitrogen

Na = sodium

NH_4 = ammonium

NO_3 = nitrate

SO_4 = sulfate

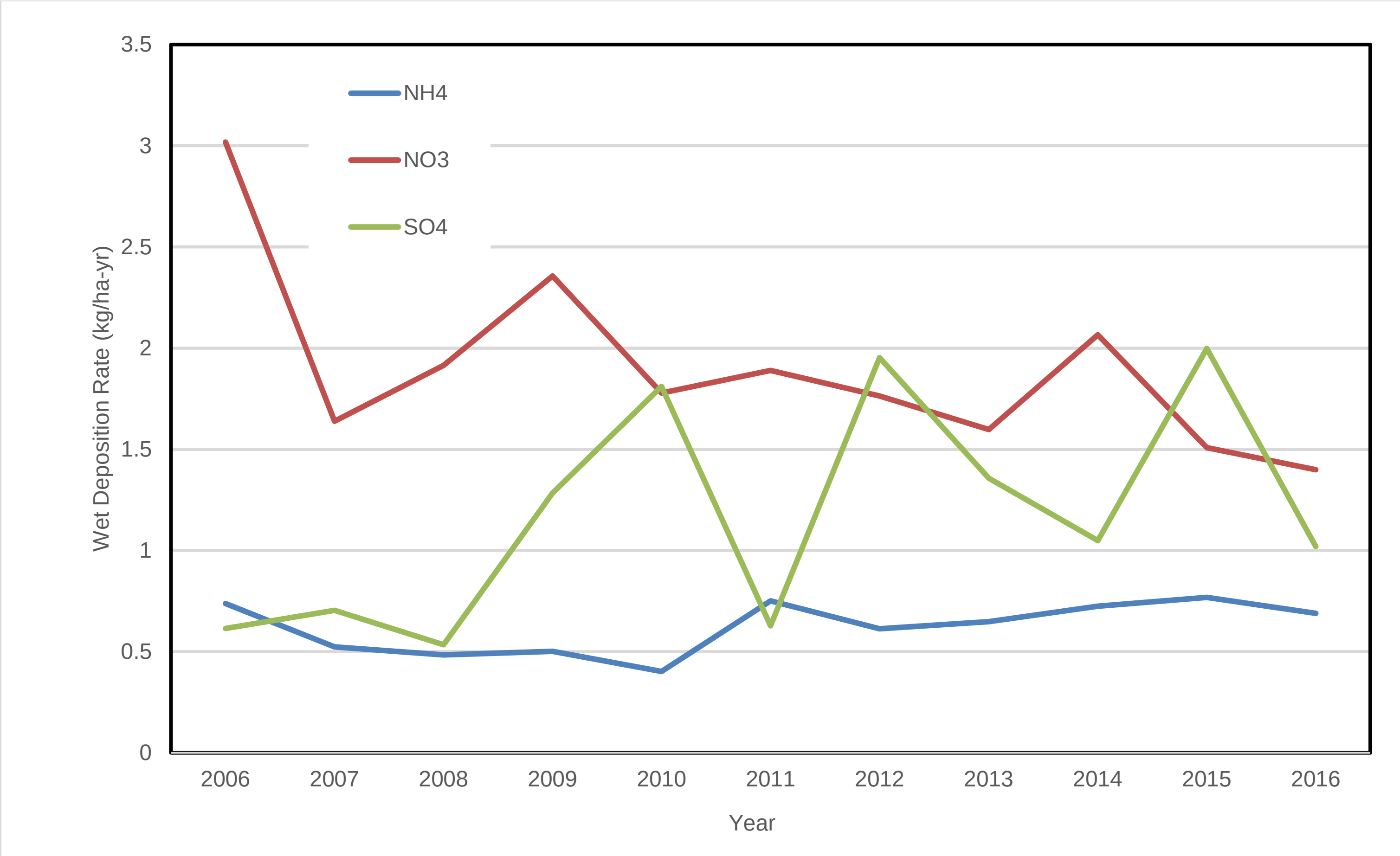

Figure Source: NADP 2019a

Figure Notes:

kg/ha-yr = kilograms per hectare per year; NH_4 = ammonium; NO_3 = nitrate; SO_4 = sulfate

Figure 3.3-5c Trends in Wet Deposition Rates – Lost Trail Pass, 2006-2016

Table 3.3-7 CASTNET Dry Deposition Rates, Annual Average – Two Idaho Sites

Year	Site NTP006 Dry Nitrogen Deposition Rate (kg/ha-yr)	Site NTP006 Dry Sulfur Deposition Rate (kg/ha-yr)	Site RCK263 Dry Nitrogen Deposition Rate (kg/ha-yr)	Site RCK263 Dry Sulfur Deposition Rate (kg/ha-yr)
2007	0.553	1.425	0.233	0.751
2008	0.633	1.752	0.177	0.481
2009	0.513	1.334	0.350	0.643
2010	0.69	2.081	0.603	1.042
2011	0.547	1.704	0.210	0.545
2012	0.697	2.053	0.650	0.598
2013	0.733	2.837	0.453	1.560
2014	0.527	2.056	0.350	1.221
2015	0.377	1.941	0.267	0.806
2016	0.513	1.853	0.340	0.652
Mean	**0.578**	**1.904**	**0.363**	**0.830**
Median	**0.550**	**1.897**	**0.345**	**0.702**

Table Source: EPA 2018b

Table Notes

kg/ha-yr = kilograms per hectare per year

(1 kg = 2.2 lbs.; 1 hectare = 2.5 acres)

Site NTP006 - Nez Perce Tribal Land

Site RCK263 - Reynolds Creek

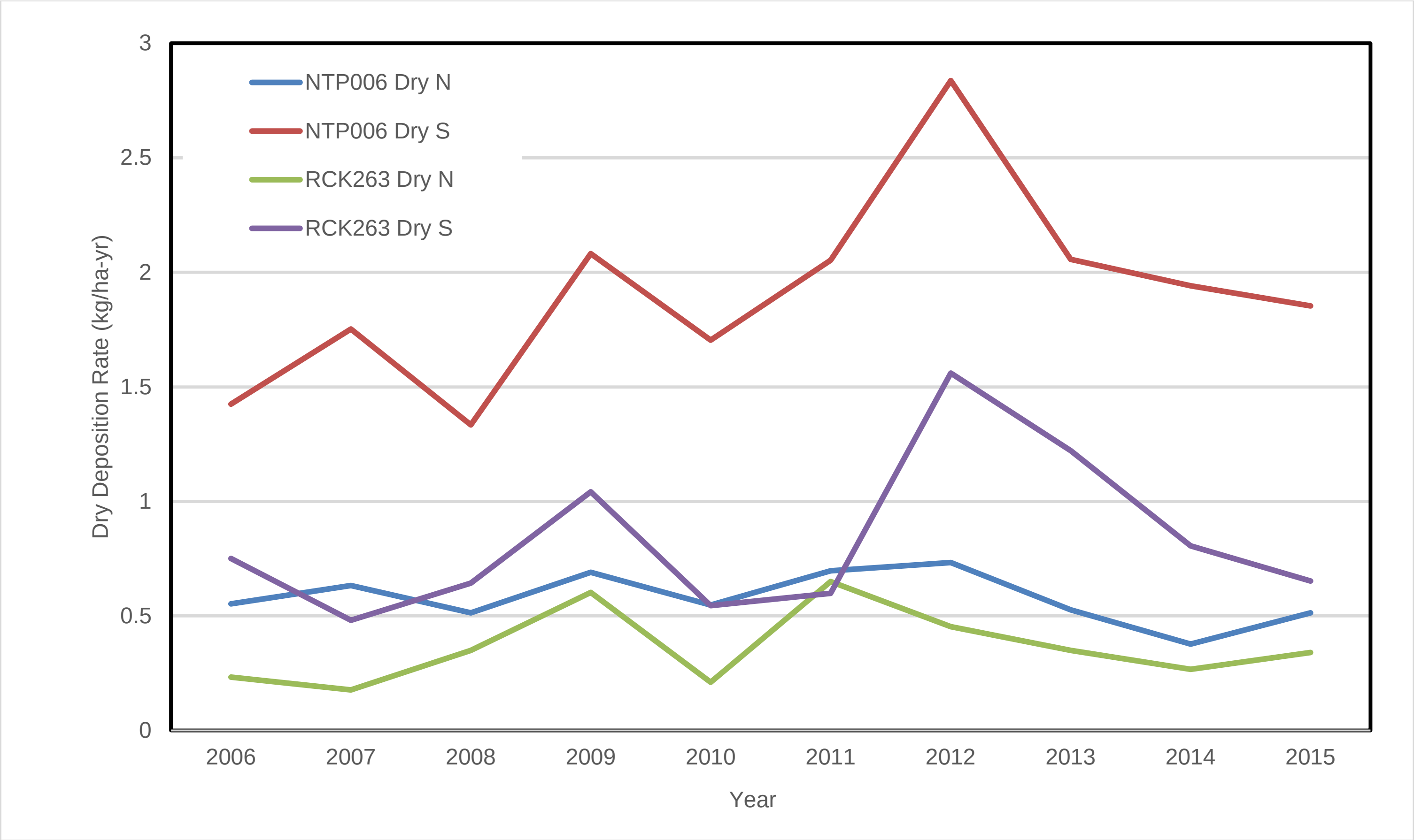

Figure Source: EPA 2018b

Figure Notes:

kg/ha-yr = kilograms per hectare per year

Site NTP006 - Nez Perce Tribal Land; Site RCK263 - Reynolds Creek

Figure 3.3-6 Trends in Dry Nitrogen and Sulfur Deposition Rates, 2006-2016

Table 3.3-8 Historical Annual Average Concentration and Mercury Deposition Rates – Three Idaho MDN Sites

Year [b]	Station Name (MDN ID) [1,2]	Precipitation Collected (dm/yr) [a]	Average Precipitation Mercury Concentration (ng/L)	Mercury Deposition Rate (µg/m²-yr)
2007	Craters of the Moon NM (ID03)	2.01	14.10	2.83
2008	Craters of the Moon NM (ID03)	5.51	6.45	3.36
2009	Craters of the Moon NM (ID03)	3.91	16.71	6.53
2009	Deer Flats, ID (ID98)	2.15	10.56	2.27
2009	McCall, ID (ID99)	6.52	8.09	5.27
2010	Craters of the Moon NM (ID03)	3.91	14.03	5.48
Mean	**All Stations**	**3.95**	**11.65**	**4.29**

Table Source: NADP 2018

Table Notes:

1 Individual annual measurements for precipitation and mercury deposition data available for three sites: ID03 Craters of the Moon National Monument; ID98 Deer Flats, Idaho; ID99 McCall Idaho.

2 The three MDN sites within the far field analysis area ceased operation by 2010.

µg/m^2-yr = deposition rate as micrograms mercury per square meter per year.

dm = decimeter.

ng/L = nanograms per liter precipitation.

3.3.3.5 Climate and Meteorology

The mine site is located in the central portion of the Salmon River Mountain Range, in central Idaho, approximately 10 air miles east of the village of Yellow Pine. The SGP Operations Area Boundary and the broader analysis area are classified as a Warm-Summer Continental Climate (Weatherbase.com). In this region, the climate typically ranges from warm, dry summers to cold, wet winters. However, the locale of the mine site is semi-arid as a result of the Cascade and Sierra Nevada mountains to the west and the Bitterroot and Rocky Mountains to the north, which effectively prevents large scale intrusion of Pacific moisture.

As described by the Western Regional Climate Center (WRCC), organized storm fronts frequently move through the region during winter, resulting in cold outbreaks, and can produce snowfall accumulations over 2 feet or more. Cloudy and unsettled weather is common during the winter with measurable precipitation occurring roughly a third of the days. The summer months are typically dominated by high pressure over the Great Basin resulting in warm days with very little precipitation. In general, temperatures in the cooler months average below 30 degrees Fahrenheit (°F) and average above 50°F during the warmer months (WRCC 2018a,b).

Spring months are normally wet and windy with periods of high winds that may persist for days at a time. Weather conditions fluctuate quickly during the spring. Afternoon temperatures in the range of 30 to 50°F with precipitation in the form of rain or snow may occur interspersed with periods of sunny skies and afternoon temperatures between 50 to 70°F. Thunderstorms are not uncommon and are usually accompanied by rain showers and occasional snow. Low elevation snowpack usually melts quickly during the spring, but high elevation snowpack can persist into June or later in the year (WRCC 2018a,b).

The nearest location with a long-term climatological data record is the McCall, Idaho, municipal airport station, which is located approximately 37 air miles west and 1,575 vertical feet below the mine site. The McCall National Weather Service station also monitors surface temperature, dew point and wind speed, direction, and highest gust speed (National Oceanic and Atmospheric Administration 2018). While regionally representative, it can be assumed that the McCall airport data will be slightly warmer with lower amounts of precipitation due to its lower elevation compared to the mine site. The average maximum annual temperature is 54ºF and during the warmest month (July) the average maximum monthly temperature is 81ºF. The average minimum annual temperature is 27ºF and during the coldest month (January) the average minimum monthly temperature is 11ºF (National Oceanic and Atmospheric Administration 2018). **Table 3.3-9** provides the daily average temperature range parameters for the McCall station for the years 1997 to 2008 (WRCC 2018b). The daily average minimum and maximum temperatures for each month recorded in for McCall also are plotted in **Figure 3.3-7.**

The Big Creek Summit Site is operated by the National Water and Climate Center's Snow Telemetry (SNOTEL) network. The site is located 28 miles southwest of the mine site at approximately the same elevation and latitude. The site provides data for surface temperature, precipitation, snow water equivalent, and snow depth. The monthly average precipitation and snowfall information for the Big Creek Summit Site can be considered representative of the mine site, and is shown in **Table 3.3-10** (National Resources Conservation Service [NRCS] 2018). Although the climatological data is quoted for different spans of years, this available data provides covers sufficiently long periods to provide representative average values.

Table 3.3-9 Average Temperature Data from McCall National Weather Service Site

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Avg. Max Temp (F)[1]	28.6	32.5	39.3	47.8	58.8	67.6	80.4	78.1	67.9	54.5	39.5	28.2	51.9
Avg. Min Temp (F)[1]	10.4	9.9	16.6	24.5	32.6	37.6	44.1	41.2	33.5	25.6	19.4	11.0	25.5

Table Source: McCall Municipal Airport (WRCC 2018b)

Table Notes:

1 Data from the McCall Municipal Airport, National Weather Service Station averaged from 1997 to 2008.

°F = degrees Fahrenheit.

Avg. = average.

Table 3.3-10 Average Precipitation Data from Big Creek Summit SNOTEL Site

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Avg. Total Precipitation (in)[1]	6.5	5.0	5.1	4.1	3.5	2.3	0.8	0.90	1.6	2.8	6.1	7.1	3.8
Snow Water Equivalent (avg, in)[1]	13.8	21.1	26.0	31.4	27.7	12.8	0.0	0.0	0.0	0.0	0.9	5.6	11.6
Snow Depth (avg, in)[2]	51.0	67.9	75.5	83.7	66.2	21.4	0.0	0.0	0.0	0.0	2.9	21.1	38.9

Table Source: Big Creek Summit Site (NRCS 2018)

Table Notes:

1 Data from the Big Creek Summit SNOTEL Station averaged from 1981 to 2010.

2 Data from the Big Creek Summit SNOTEL Station averaged from July 2000 to January 2015.

Avg. = average.

In = inches.

3.3.3.5.1 TEMPERATURE

Between 2010 and 2014, the maximum hourly temperature recorded at the McCall site was 95°F during 2013. Typically, the maximum hourly temperature occurred during July or August. The minimum hourly temperature recorded at the McCall site was -18°F during 2010. In winter the minimum hourly temperature occurred on numerous days between December and February. Diurnal temperature ranges were the largest in the warmer months (April to September) and decreased during the cooler months (WRCC 2018b). The maximum and minimum daily average temperatures between 1997 and 2008 are shown on **Figure 3.3-7**.

The hourly temperatures recorded at the Big Creek Summit site would be comparable to the mine site, as this station is at the same elevation. Between 2010 and 2014 highest hourly temperature was 90°F, recorded during 2013. Typically, the maximum hourly temperature occurred during July or August. The minimum hourly temperature recorded at the Big Creek Summit site was -13°F during 2010. Typically, the minimum hourly temperature occurred on numerous days between December and February. Diurnal temperature ranges were the largest in the warmer months (April to September) and decreased during the cooler months (National Oceanic and Atmospheric Administration 2018).

3.3.3.5.2 PRECIPITATION

Precipitation data for the Big Creek Summit SNOTEL site over the period 1981 to 2010 show that monthly average totals range from 5 to 7 inches per month during the cool months (November - March) primarily in the form of snow. The summer is dry, with monthly average precipitation typically less than 2 inches per month from June through September. Annual precipitation recorded at the Big Creek Summit site was approximately 51 inches in 2010, 47 inches in 2011, 55 inches in 2012, 35 inches in 2013, and 53 inches in 2014. **Figure 3.3-7** plots total precipitation by month averaged over the years 1998 to 2010. (NRCS 2018; WRCC 2018b).

3.3.3.5.3 WIND

Baseline wind speed and direction data at the Stibnite monitoring station were collected from November 2013 to June 2015. During this period, the strongest winds were from the southwest and from the west-southwest. The mean wind speed was 2.3 meters per second (5.2 miles per hour). Wind directions had a strong tendency from the southwest. Speeds varied widely but tended to be strongest from the southwest. The Stibnite wind distribution data collected at the on-site meteorological station from January 2014 to December 2014 are shown in **Figure 3.3-8** (Air Sciences 2018).

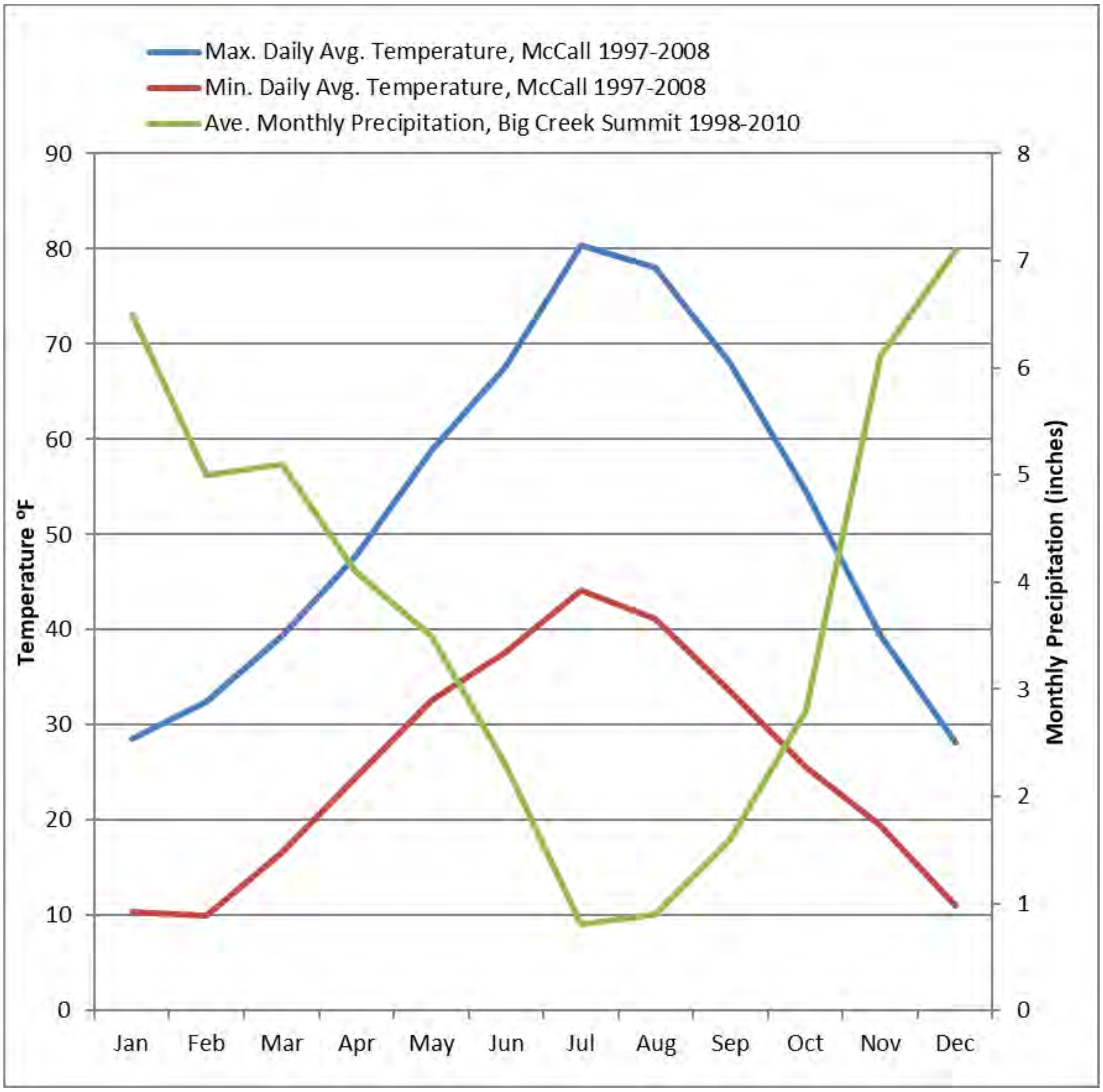

Figure Source: NRCS 2018; WRCC 2018b

Figure 3.3-7 Temperature Range Data for McCall, Idaho, and Monthly Precipitation for Big Creek Summit SNOTEL Site

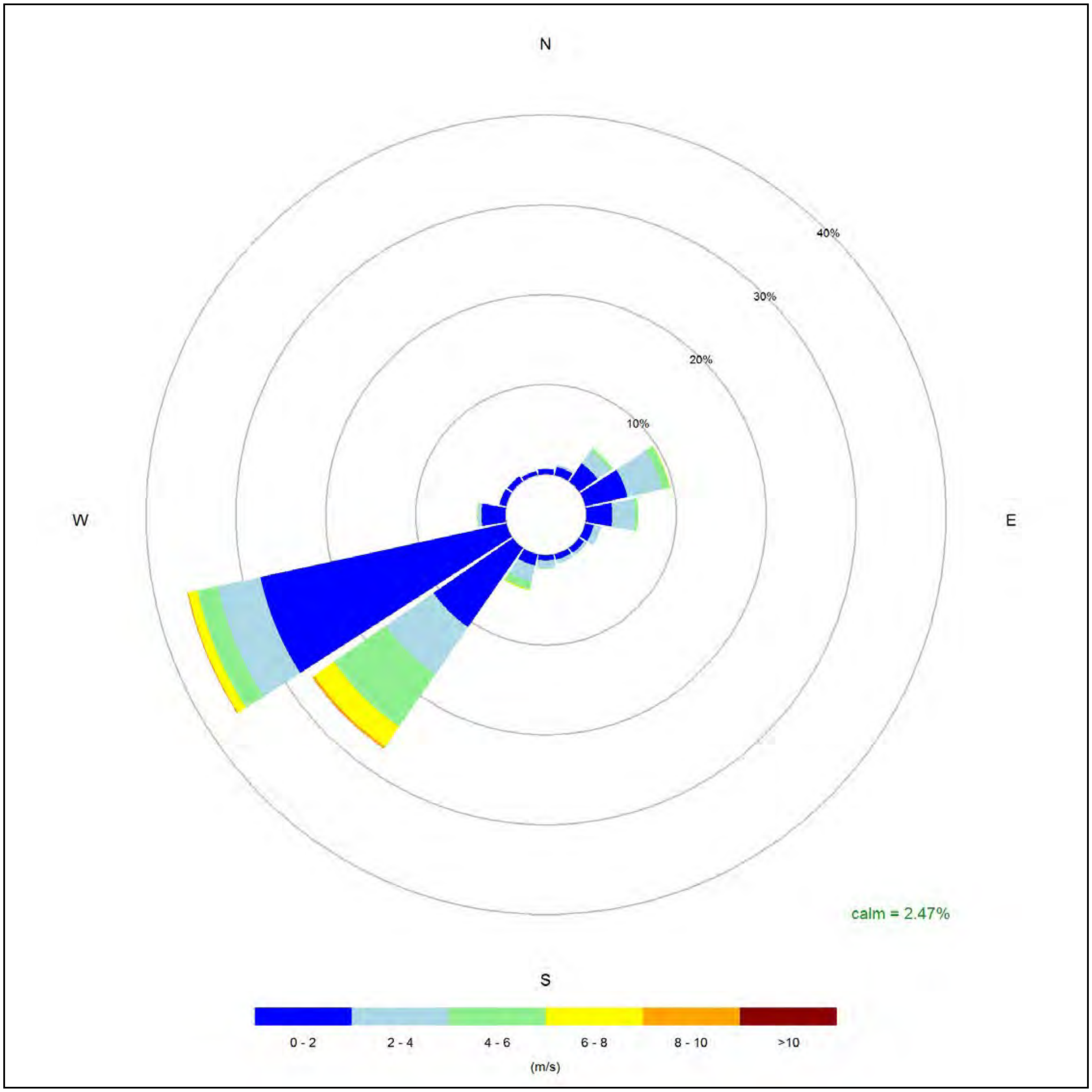

Figure Source: Air Sciences 2018

Figure 3.3-8 Wind Distribution - Stibnite Mine Site, 2014

3.4 CLIMATE CHANGE

3.4.1 Introduction and Scope of Analysis

The United Nations Framework Convention on Climate Change (United Nations 1992) defined climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." Global climate is changing, and is projected to continue to change, with the degree of change varying based on different greenhouse gas (GHG) emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) and regional geographic variation. Increasing variation in temperatures, precipitation, and snowpack, along with the increasing frequency and intensity of extreme weather events are indicators of a changing climate in Idaho (Runkle et al. 2017). These varying conditions on a regional scale may affect conditions in the analysis area.

GHGs consist of compounds in Earth's atmosphere that absorb outgoing long-wave radiation emitted from its surface, resulting in warming of the atmosphere, which affects Earth's climate. GHGs occur naturally from volcanoes, forest fires, and biological processes such as fermentation and aerobic decomposition; however, during the past century human activities have released increasingly large amounts of GHGs through the combustion of fuels, industrial processes, agricultural operations, waste management, and land use changes such as loss of farmland to urbanization. The most common anthropogenic GHG emissions are in the form of carbon dioxide (CO_2), followed by methane (CH_4) and nitrous oxide (N_2O) (United States [U.S.] Environmental Protection Agency [EPA] 2017a). Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes.

A common property among GHGs is their relative chemical stability and persistence in the atmosphere, which allows the gases to accumulate and become relatively well-distributed in the atmosphere before eventually being decomposed by physical or chemical mechanisms. From 1880 to -2012, the global average combined land and ocean surface temperature data show a warming of 0.85 degrees Celsius (°C) (i.e., 1.5 degrees Fahrenheit [°F]) (IPCC 2014). This trend is expected to continue, which could cause large-scale changes including variability in precipitation, increases in annual average temperatures, and increases in extreme weather events (e.g., severe storms, prolonged droughts, flooding) (IPCC 2014). The time horizon for many of these effects is during the 21st century, though projections are subject to variability and uncertainty. The extent to which these effects can be predicted to occur in a given geographic area or be attributed to a single source is uncertain; however, given the potential for GHG emissions associated with the alternatives' components, these effects warrant discussion as a part of the analysis.

The tendency for GHGs to be stable and well distributed spreads their effects over a large region, beyond the initial location of the emissions. Additionally, climate is characterized on a regional scale, not by a specific boundary. Consequently, the overall potential effects on climate change attributable to GHGs are evaluated over large regional or global scales, rather than in a given airshed or project-specific area. As such, a specific analysis area for GHGs is not relevant to the assessment of potential GHG contributions by any one project and it is not currently feasible to quantify the effects of individual or multiple projects on global climate change (U.S. Forest Service [Forest Service] 2009).

The scope of analysis for the qualitative discussion of GHG emissions associated with the Stibnite Gold Project (SGP) is tied to the baseline GHG emissions and current climate conditions and trends that are discussed further in Section 3.4.3.1, GHG Inventory Information. The scope of analysis for the effects of climate change on resources in the analysis area is discussed within the context of the analysis area for each particular resource. The current climate change trends related to social, physical, and biological resources are discussed further in Section 3.4.3.2, Climate Change Trends, and Section 3.4.3.3, Current Climate Change Impacts to Resources in the SGP Area.

3.4.2 Relevant Laws, Regulations, Policies, and Plans

There are currently no federal or state regulatory programs that require GHG emission reductions or controls on new or existing facilities in Idaho. The sections below describe the limited regulatory guidance that exists for GHGs and climate change under the National Environmental Policy Act (NEPA) and from the Forest Service, as well as other guidance from the EPA and state of Idaho for monitoring, reporting, and reducing GHG emissions.

3.4.2.1 National Environmental Policy Act and Executive Order 13783

On August 1, 2016, the federal Council on Environmental Quality (CEQ) issued final guidance describing how federal departments and agencies should consider the effects of GHG emissions and climate change in their NEPA reviews (81 Federal Register 51866). Executive Order (EO) 13783 on Promoting Energy Independence and Economic Growth directed CEQ to rescind this final guidance, and the CEQ guidance was withdrawn on April 5, 2017 (82 Federal Register 16576). After further consideration of EO 13783, CEQ released draft guidance on June 26, 2019 (85 Federal Register 30097) on how NEPA analysis and documentation should address GHG emissions. The June 26, 2019 guidance would replace the August 2016 guidance, if finalized. The guidance states that agencies should utilize their expertise and experience to decide how and to what degree to analyze particular effects and a projection of the direct and reasonably foreseeable indirect GHG emissions from project components may be used as a proxy for assessing potential climate effects. Where GHG inventory information is available, local, regional, national, or sector-wide emission estimates may be referenced to provide context for understanding the relative magnitude of GHG emissions for a project. A qualitative analysis may be used in addition to GHG inventory information, or when the tools, methods, or data inputs necessary to quantify GHG emissions are not available, not of high quality, or the complexity of identifying emissions would make quantification overly speculative (CEQ 2019).

The draft 2019 CEQ guidance indicates that a monetary cost-benefit analysis of GHG emissions using any monetized Social Cost of Carbon estimates is not required in every project-level NEPA analysis (CEQ 2019):

> *"If an agency does consider costs and benefits that are relevant to the choice among environmentally different alternatives for a proposed action, such as in a rulemaking, the agency should incorporate by reference or append such analyses to the environmental impact statement as an aid in evaluating the environmental consequences."*

EO 13783 withdrew many of the technical documents and guidance described above that were issued between 2010 and 2016, which had provided the basis for Social Cost of Carbon analyses (The White House 2017). The EO directed that the Interagency Working Group on Social Cost of GHGs be disbanded, that technical documents issued by the Interagency Working Group be withdrawn as no longer representative of governmental policy, and stated that when monetizing the value of GHG emission changes, agencies are to ensure such estimates are consistent with guidance contained in U.S. Office of Management and Budget Circular A-4 (U.S. Office of Management and Budget 2003). For purposes of NEPA reviews, the pertinent theme of the 2003 guidance is that qualitative analysis is appropriate in cases when quantifying the costs and benefits of a particular policy decision (e.g., licensing, permitting, development of regulations) is not practically feasible, or subject to high uncertainty that would have the effect of impeding the decision.

3.4.2.2 National Forest Land and Resource Management Plans

There are no specific standards or guidelines related to climate change in the Payette National Forest Land and Resource Management Plan (Forest Service 2003) or the Boise National Forest Land and Resource Management Plan (Forest Service 2010). However, Climate Change Considerations in Project Level NEPA Analysis (Forest Service 2009) provides Forest Service guidance on how to consider climate change in project-level NEPA analysis and documentation. The following basic concepts are outlined in this document:

1. Climate change effects include the effects of agency action on global climate change and the effects of climate change on a proposed project.
2. The agency may propose projects to increase the adaptive capacity of ecosystems it manages, mitigate climate change effects on those ecosystems, or to sequester carbon.
3. It is not currently feasible to quantify the indirect effects of individual or multiple projects on global climate change; therefore, determining significant effects of those projects or project alternatives on global climate change cannot be made at any scale.
4. Some project proposals may present choices based on quantifiable differences in carbon storage and GHG emissions between alternatives.

3.4.2.3 Mandatory Reporting of Greenhouse Gases Rule

As an initial action under the federal Clean Air Act, the EPA established a program in October 2009 for Mandatory Reporting of Greenhouse Gases Rule (40 Code of Federal Regulations 98) (Mandatory Reporting Rule). This program requires monitoring and annual reporting of GHG emissions for over 40 source categories if the facility's annual emissions exceed 25,000 metric tons of GHGs (as carbon dioxide equivalent [CO_2eq] units). The Mandatory Reporting Rule defines CO_2eq as the number of metric tons of CO_2 emissions with the same global warming potential as one metric ton of another GHG. Stationary fuel combustion emissions of CO_2, CH_4, and N_2O is identified in the Mandatory Reporting Rule as a separate category that may be present at facilities that qualify for reporting under another source category.

The Mandatory Reporting Rule facilitates collection of accurate and comprehensive emissions data to provide a basis for future EPA policy decisions and regulatory initiatives. This federal regulation stipulates the methodology for record keeping, emission estimation, and reporting of GHG emissions.

3.4.2.4 GHG Major Source Permitting – the Tailoring Rule

In June 2010, EPA issued a final rule (referred to as the Tailoring Rule) setting GHG emission thresholds for Clean Air Act preconstruction permits under the Prevention of Significant Deterioration and Title V permitting programs (75 Federal Register 31514). The Tailoring Rule established a Title V major source permitting threshold of 100,000 short tons per year for GHGs measured in CO_2eq. This framework was codified in several sections of 40 Code of Federal Regulations 51, 52, 70, and 71 (40 Code of Federal Regulations 51.166, 52.21, 52.22, 70.2, 70.12, 71.2, and 71.13). In addition, the Tailoring Rule also imposed the requirement for new major sources of GHG to implement best available control technology to reduce GHG emissions through the new source review process.

This rule was challenged in Utility Air Regulatory Group versus Environmental Protection Agency (134 S. Ct. 2427 [2014]). In June 2014, the Tailoring Rule provisions regarding GHG major source permitting were remanded by the U.S. Supreme Court (U.S. Supreme Court 2014). The Supreme Court upheld the rule in part and reversed it in part. The ruling allowed EPA to continue to regulate GHG for sources already subject to regulation as Prevention of Significant Deterioration or Title V sources for conventional criteria pollutants. However, the court also held that EPA had exceeded its authority when it issued an emissions threshold for GHGs alone that would trigger Prevention of Significant Deterioration or Title V permitting.

3.4.2.5 State of Idaho Actions

On May 16, 2007, the Governor of Idaho signed EO 2007-05, Establishing a State Policy Regarding the Role of State Government in Reducing Greenhouse Gases (Idaho Administrative Bulletin 2007). This EO recognized that, "the causes and effects of rising greenhouse gases, to the degree they are understood, may extend to the Western U.S. and the State of Idaho, and it is incumbent upon states to take a leadership role in developing responsive state-level policies and programs to reduce greenhouse gas emissions, develop alternative energy sources and use energy efficiently." The EO identified two types of actions to be taken: 1) the Director of the Idaho Department of Environmental Quality (IDEQ) is to take a lead role in coordinating GHG reduction efforts; and 2) the Director of IDEQ is to develop a state GHG emission inventory and develop recommendations on how to reduce GHG emissions in the state. Refer to **Table 3.4-1** showing the statewide GHG emissions inventory for Idaho (by sector). GHG emission reduction strategies and/or initiatives have not yet been identified for the state.

3.4.3 Existing Conditions

Existing conditions for climate change are discussed in terms of baseline GHG emissions in the analysis area, as well as potential effects from climate change on the social, physical, and biological resources in the analysis area.

3.4.3.1 GHG Inventory Information

The GHG compounds of interest are those that would be released due to proposed operation of diesel-fueled and gasoline-fueled engines, and propane combustion for either process needs or heating of buildings. The use or release of any hydrofluorocarbons or perfluorocarbons would not be necessary for the proposed SGP. To provide context for emissions associated with the SGP, this section also presents GHG inventory information for national and regional sources.

3.4.3.1.1 EPA Publication of National GHG Inventory Data

Compared to 1990, annual GHG emissions in the U.S. have increased by about 3.5 percent, based on 2015 reported data (EPA 2017b). However, year-to-year emissions are shown to increase or decrease due to changes in the economy, the price of fuel, weather, and other factors.

The EPA reports that 2015 annual total emissions of CO_2 were 5.6 percent higher than 1990 totals, while total emissions of CH_4 were 16.0 percent lower, and total emissions of N_2O were 6.9 percent higher (EPA 2017b). GHG emissions in the U.S. were partly offset by carbon sequestration in managed forests, trees in urban areas, agricultural soils, landfilled yard trimmings, and coastal wetlands. In recent years, there has been a general nationwide trend of declining GHG emissions across most sectors (EPA 2017b).

In 2015, the latest reporting year available, electric power generation and transportation vehicles accounted for 34 and 27 percent, respectively, of U.S. emissions of GHG. Industrial sources (the reporting category that includes mining activities other than coal) accounts for 20 percent of GHG emissions nationwide. GHG emissions from industry are mainly associated with burning fossil fuels (e.g., coal, natural gas) for heat energy, as well as emissions from non-road vehicles and equipment, and manufacturing processes to produce goods from raw materials (EPA 2017b).

3.4.3.1.2 GHG Emission Inventory for Idaho

Table 3.4-1 shows reported statewide GHG emissions from all source sectors for 2000 through 2010. Idaho is a relatively small contributor to U.S. GHG emissions. Based on the 10-year average of 27.82 million metric tons of CO_2eq per year, Idaho's total GHG emissions accounted for less than 0.5 percent of U.S. GHG emissions during that period (IDEQ 2010). The three highest contributing sectors to Idaho GHG emissions are on-road transportation vehicles (31.4 percent), agriculture (33.0 percent), and residential/commercial/industrial fuel use (21.1 percent). The industrial process category is a smaller contributor at 4.3 percent of statewide GHG emissions. Mineral mining is not designated separately, and is assumed to be a small overall contributor.

3.4.3.2 Climate Change Trends

Climate change is often discussed in terms of plausible futures or scenarios based on precipitation and temperature projections. These scenarios are built on different trajectories of future GHG concentrations, land use, and other factors, due to the uncertainty associated with GHG emissions and concentrations, and uncertainty in climate functions. IPCC released new emission scenarios in 2013 called Representative Concentration Pathways (RCPs). RCPs are based on a range of potential future rates of factors such as economic growth, population, and energy consumption, which are translated into emissions and concentrations of GHGs over time and then run through climate models to predict future values of temperature and precipitation. RCP 8.5 represents a scenario where high emissions continue through 2100 (Federal Highway Administration 2017); the discussion of emissions and climate change trends throughout this section are based on the projected scenarios under RCP 8.5.

The IPCC Fifth Assessment Report documents evidence for the warming of the global climate system since the 1950s, based on observed changes over time periods ranging from decades to millennia (IPCC 2014). In this assessment, the IPCC reports the global average temperature has increased between 0.08 to 0.14°C (0.14 to 0.25°F) per decade since 1951, and each of the last three decades has been successively warmer than any preceding decade since 1850. In the Northern Hemisphere, 1983 to 2012 was likely the warmest 30-year period of the last 1,400 years (IPCC 2014).

As described below, the effects of climate change in the analysis area can be seen by review of reported trends in the temperature, precipitation, snowpack, and other indicators of regional climatology. Similarly, statewide climate trends also reflect the measurable effects of regional climate change that will continue to affect the environmental conditions in the analysis area. These statewide and regional trends are used as a proxy to discuss current climate trends in the analysis area.

Table 3.4-1 Statewide GHG Emissions Inventory for Idaho, by Sector[1]

Source Category	Fuel Type or Process Activity	2000 MMT CO_2eq	2005 MMT CO_2eq	2010 [2] MMT CO_2eq	2010 Sector Portion of Annual Emissions (%)	2000-2010 Average MMT CO_2eq	% Change, 2000 to 2010
Electricity Generation - Statewide 2	Coal	0	0	0	0.0	0.0	0.0
Electricity Generation - Statewide 2	Natural Gas	0.09	0.62	0.70	2.4	0.47	678
Electricity Generation - Statewide 2	Petroleum (fuel or distillate oil) [3]	0.002	0	0	0.0	0.0	0.0
Electricity Generation - Statewide 2	***Subtotals of all Fuel Types***	***0.09***	***0.62***	***0.70***	***2.4***	***0.47***	***661***
Residential/Commercial/Industrial Fuel Use	Coal	1.30	1.07	0.95	3.2	1.11	-26.7
Residential/Commercial/Industrial Fuel Use	Natural Gas	3.49	3.19	3.45	11.8	3.38	-1.15
Residential/Commercial/Industrial Fuel Use	Petroleum (fuel or distillate oil)	1.97	2.24	1.79	6.1	2.0	-9.14
Residential/Commercial/Industrial Fuel Use	***Subtotals of all Fuel Types***	***6.76***	***6.50***	***6.19***	***21.1***	***6.48***	***-8.43***
Transportation Fuels	Cars, Light Trucks, Rail, Aircraft	**8.74**	**8.54**	**9.21**	**31.4**	**8.83**	**5.38**
Fossil Fuel Industry	Coal Mining (CH_4) [4]	0	0	0	0.0	0.0	0.0
Fossil Fuel Industry	Natural Gas Extraction/Transport	0.45	0.42	0.46	1.6	0.44	2.22
Fossil Fuel Industry	Petroleum Production/Refining [5]	0	0	0.0	0.0	0.0	0.0
Fossil Fuel Industry	***Subtotals of all Fuel Types***	***0.45***	***0.42***	***0.46***	***1.6***	***0.44***	***2.22***
Industrial Processes	Perfluorocarbons / sulfur hexafluoride / Cement/Lime Prod.	***0.77***	***1.05***	***1.27***	***4.3***	***1.03***	***64.94***
Waste Management	Solid Waste Management	1.18	1.50	1.63	5.6	1.44	38.14
Waste Management	Wastewater Management	0.14	0.15	0.16	0.5	0.15	14.29
Waste Management	***Subtotals of all Fuel Types***	***1.32***	***1.65***	***1.79***	***6.1***	***1.59***	***35.61***
Agriculture	Enteric Fermentation (CH_4)	3.30	3.88	4.08	13.9	3.75	23.64

Source Category	Fuel Type or Process Activity	2000 MMT CO_2eq	2005 MMT CO_2eq	2010 [2] MMT CO_2eq	2010 Sector Portion of Annual Emissions (%)	2000-2010 Average MMT CO_2eq	% Change, 2000 to 2010
Agriculture	Manure Management	1.6	2.13	2.36	8.1	2.03	47.50
Agriculture	Agricultural Soils (N_2O) and Residue Burning	2.71	3.64	3.23	11.0	3.19	19.19
Agriculture	***Subtotals of all Fuel Types***	***7.61***	***9.7***	***9.67***	***33.0***	***8.98***	***27.07***
Annual Totals	***All Subtotals except percentages***	***25.7***	***28.4***	***29.3***	***--***	***27.8***	***--***

Table Source: IDEQ 2010

Table Notes:

1 The emission values in **Table 3.4-1** for year 2010 are based on IDEQ projections presented in the 2010 report Idaho GHG Inventory and Reference Case Projections (IDEQ 2010).

2 The 2010 emissions values were projected by IDEQ from emissions inventory data available for the 2010 report. The projected emissions were based on anticipated population and economic growth rates.

3 The State of Idaho does not have in-state coal or petroleum electrical generation. The state has very high levels of renewable generation, and GHG sources in the electrical sector are predominately natural gas fired generation.

4 There is no coal mining industry in Idaho.

5 There is no petroleum production industry in Idaho.

-- There are no annual totals for 2010 Sector Portion of Annual Emissions Percentages or Percent Change, 2000 to 2010.

MMT = million metric tons.

Average annual temperature is an important climate indicator that directly reflects regional energy balance. Overall, temperature trends affect energy use, snowmelt and runoff, as well as a host of biological life functions. Most of Idaho has seen an increase in average temperatures of 0.56 to 1.1ºC (1 to 2 ºF) over the last century, with the last two decades being the warmest on record (EPA 2016). Temperatures have generally increased across the northwest region of the U.S. from 1895 to 2014, with a regionally averaged warming of about 0.83ºC (1.5°F). Average minimum and maximum temperatures for the middle Rockies region, which includes the Payette, Boise, Salmon-Challis, Sawtooth, and portions of the Caribou-Targhee National Forests, are projected to warm by about 5.6ºC (10°F) under RCP 8.5 by 2100, with increases projected to be the largest during summer months (Halofsky et al. 2018). The projected increase in minimum temperature in this region by the year 2100 under the RCP 8.5 scenario will bring the median temperature above freezing, suggesting that a biologically meaningful threshold could be crossed (Halofsky et al. 2018). Additionally, the intensity of heat waves is projected to increase, while cold wave intensity is projected to decrease (Runkle et al. 2017).

General precipitation trends in Idaho and the Pacific Northwest have been observed to be both increasing and decreasing among various locations, seasons, and time periods of analysis. Statewide precipitation is highly variable and showed no overall trend in annual average precipitation during the last century. However, the frequency of extreme precipitation events in Idaho has been above average over the past decade. Statewide winter and spring precipitation is expected to increase during the 21st Century, while precipitation in the summer is expected to decrease (Runkle et al. 2017). Overall, precipitation is projected to increase by 5 to 8 percent by the year 2100 under RCP 8.5 (Halofsky et al. 2018). Prolonged drought conditions, common throughout the 1920s and 1930s, have not been observed in recent decades (University of Idaho 2011); however, increased intensity of drought events is expected to occur throughout the 21st Century (Runkle et al. 2017). Future projections show a highly variable change in annual average precipitation throughout the northwest region of the U.S., within a range of an 11 percent decrease to a 12 percent increase for 2030 to 2059 and a 10 percent decrease to an 18 percent increase for 2070 to 2095 (Halofsky et al. 2018).

Changes in river-related flood risk depends on many factors, but warming is projected to increase flood risk the most in mixed basins (those with both winter rainfall and late spring snowmelt-related runoff peaks) and remain largely unchanged in snow-dominant basins (Mote et al. 2014). Across the northwest region, much of the water supply comes from mountain snowpack, which melts in spring and summer and runs off into rivers, filling reservoirs. As the climate warms, less precipitation falls as snow and more snow melts during the winter, which decreases the snowpack. Since the 1950s, Idaho's overall snowpack has been decreasing (EPA 2016). Lower snowpack and increased drought are likely to lead to lower base flows, reduced soil moisture, wetland loss, riparian area reduction or loss, and more frequent and possibly severe wildfire. Places that experience temperatures near the melting point of snow are expected to be more sensitive than places where temperatures remain below freezing throughout much of the winter, despite warming (Halofsky et al. 2018). The projected rise in temperatures is expected to increase the average lowest elevation where the snowpack reliably accumulates throughout the winter, which may cause the tree line to shift, as subalpine fir and other high- altitude trees become able to grow at higher elevations. Warmer temperatures may increase the frequency of precipitation falling as rain instead of snow, reducing overall water storage in the snowpack. Rising temperatures also could result in earlier melting of the snowpack, further decreasing water availability during the dry summer months (Runkle et al. 2017).

Increasing air temperatures and decreasing summer flows associated with climate change are expected to warm streams by increasing long-wave radiation and warming groundwater inputs (Isaak et al. 2017). Catastrophic fire and drought can drastically alter water quality and temperature, woody debris, bank vegetation, and stream flow characteristics. Reduced stream cover from changes in woody debris and bank vegetation also can result in increased stream temperatures (Halofsky et al. 2018). A transition from snow to rain, resulting in diminished snowpack and shifts in streamflow to earlier in the season, also could cause changes in groundwater recharge to aquifers and groundwater discharge to groundwater-dependent ecosystems. Mean annual streamflow projections suggest a slight increase; however, despite these projections, summer low flows are expected to decline. Furthermore, higher minimum temperatures reducing the longevity of snowpack will decrease the length of time aquifer recharge can occur, potentially leading to faster runoff and less groundwater recharge (Halofsky et al. 2018).

Climate controls the magnitude, duration, and frequency of weather events (e.g., wind, temperature, relative humidity, and precipitation), which, in turn, drive fire behavior (Halofsky et al. 2018). A warming climate and earlier snowmelt patterns have led to longer fire seasons, and these trends are expected to continue; however, fire activity is limited by the availability of fuels, and future climate projections that influence fire occurrence and behavior are uncertain at the regional and local scale. Most visible and significant short-term effects of climatic changes on forest ecosystems are caused by altered disturbance regimes, such as insects and fire. The size and duration of forest fires, the length of the fire season, and size of areas burned in the West have increased over the past 30 years (Halofsky et al. 2018). The annual area burned, as well as the occurrence of very large wildfires, is projected to continue increasing as temperatures rise and longer fire seasons combine with regionally dry fuels. Future wildfire severity will be dependent on vegetation changes and fuel conditions (Halofsky et al. 2018).

3.4.3.3 Current Climate Change Impacts to Resources in the SGP Area

Given that climate change impacts are likely to persist in the region, analysis area resource conditions are expected to be affected. Due to the nature of the resource, climate change is not expected to impact noise.

3.4.3.3.1 Geologic Resources and Geotechnical Hazards

Current climate change trends, such as increased heavy precipitation events and more precipitation falling as rain instead of snow, could lead to increased soil erosion and change in landcover, which could potentially impact slope stability in the analysis area. Damage due to seismic activity in the area also could be exacerbated by climate-induced instability in the analysis area.

3.4.3.3.2 AIR QUALITY

Climate-induced changes in weather and seasonality can strongly affect air quality in a specific region. The criteria air pollutant of most concern, and may be most affected by changes in climate, is particulate matter (PM), which primarily consists of sulfate and nitrate compounds, organic carbon, elemental carbon, soil dust, and sea salt. Of most concern to human health are the first four pollutants, because they are typically present as fine particles less than 2.5 microns in diameter and can be inhaled deep into the lungs. Sulfate, nitrate, and organic carbon are produced in the atmosphere by oxidation of anthropogenic emissions of sulfur dioxide, nitrogen oxides, and non-methane volatile organic compounds. Carbon particles also are directly emitted by combustion. Seasonal variation of PM is complex and location dependent; precipitation is the main atmospheric sink for PM (Jacob and Winner 2009). An overall increase in precipitation levels may improve the cleansing of the atmosphere and may increase chemical deposition.

Hotter, drier weather can allow PM and other pollutants to accumulate in the atmosphere, or allow emitted PM precursors to persist longer in the atmosphere.

The effect of climate change on PM is complicated and uncertain. Precipitation frequency and mixing depth are important driving factors, but projections for these variables are often unreliable. As a result of climate change, more frequent and intensified wildfires could become an increasing PM source, and decreases in summer precipitation could exacerbate high PM concentrations caused by wildfires (Jacob and Winner 2009).

3.4.3.3.3 SOILS AND RECLAMATION COVER MATERIALS

Reduced soil moisture is expected to result from lower snowpack due to higher variation in precipitation and increased annual average temperatures. Higher temperatures may increase the rate at which carbon stored in the soil degrades or is released by fire. In addition, carbon content in soils is expected to decrease in areas where the decomposition rate and wildfire frequency increase. More winter precipitation falling as rain instead of snow could generate a higher frequency of runoff and erosional processes from disturbance events, such as fire. Soil erosion by wind and/or water may result in loss of topsoil, which could lead to the degradation of soil quality (Halofsky et al. 2018).

3.4.3.3.4 HAZARDOUS MATERIALS

Although climate change would not impact the likelihood of a spill, it could potentially impact the severity of a spill. Warmer temperatures leading to shorter winters reduce the period of time that frozen ground could prevent a spill from reaching groundwater; however, lower groundwater tables from drier periods also would increase the distance for the substance (fuel or other hazardous material) to travel to reach the groundwater, reducing the potential severity of a spill. Periods of increased precipitation and flooding could have the highest impact on spill severity. Increased soil moisture content reduces the ability of oil to seep into the ground and increases the distance a spill could spread over land; however, this risk would be reduced in areas of decreased soil moisture. High streamflows after extreme precipitation events would mean a release into surface waters could travel longer distances before being contained; however, a spill occurring during a seasonal low-flow period would travel a shorter distance, reducing the risk of spill migration.

Although extreme precipitation events occur proportionally less than low-flow periods throughout the year, climate change is expected to increase their frequency and thus, the risk of coinciding spills migrating longer distances.

3.4.3.3.5 SURFACE WATER AND GROUNDWATER (QUALITY AND QUANTITY)

Streamflow, water quality, and water quantity is vital for the survival of numerous aquatic species, as well as for human use. Water is sensitive to several different physical factors, including precipitation, snowpack, evaporation, and runoff, making it an ideal indicator to determine the effects of climate variability and change. Observations compiled from 21 U.S. Geological Survey unregulated stream gauges across Idaho show a decrease in the cumulative water year streamflow by nearly 2 million cubic feet, or 15 percent, over the last half century (University of Idaho 2011). The magnitude of the peak streamflow is expected to increase slightly across the region; however, summer low flows are expected to decline (Halofsky et al. 2018). Additionally, the timing of peak streamflow from 1949 to 2008 has advanced about 1 week earlier into the spring. Advancement in the timing of peak streamflow is hypothesized to be indicative of changes in the timing of snowmelt and/or phase of precipitation (University of Idaho 2011). Spring and summer streamflows are expected to continue to decline in basins that have historically relied on snowmelt, and low flow periods are projected to be more prolonged and severe (May et al. 2018). The decline in streamflow is expected to reduce the rate of recharge of water supply in some basins (Halofsky et al. 2018).

The basin aquifer system in the central region of Idaho is recharged by precipitation and snowmelt, and reductions in the longevity of snowpack may lead to faster runoff and less groundwater recharge. The transition of watersheds from snow-dominated to rain-dominated, which diminishes snowpack and shifts streamflow to earlier in the season, would result in changes to groundwater recharge in aquifers and groundwater discharge to groundwater-dependent ecosystems (Halofsky et al. 2018). Because many biogeochemical processes are temperature-dependent, climate-induced changes in surface and groundwater temperature also could negatively impact the quality of these water resources (Halofsky et al. 2018).

Potential threats to surface water and groundwater from recent wildfires, such as the Pioneer fire in 2016, include flooding, debris flows, soil erosion and downstream sedimentation (Forest Service 2018). A growing number of wildfire-burned areas throughout the western U.S. are expected to increase soil erosion rates within watersheds; by 2050 the amount of sediment could more than double in more than one-third of watersheds and is projected to increase by more than 10 percent in nearly 90 percent of watersheds (Sankey et al. 2017).

3.4.3.3.6 Vegetation: General Vegetation Communities, Non-Native Plants, and Botanical Resources

Gradual changes in the distribution and abundance of dominant plant species and short-term impacts on vegetation structure and age classes are expected as a result of rising temperatures. The region is currently dominated by coniferous and other forested vegetation such as subalpine fir, Engelmann spruce, grand fir, Douglas fir, lodgepole pine, western larch, and whitebark pine; however, the frequency of nonnative plant species is expected to rise, displacing native species and altering fire regimes (i.e., the roles of fire in ecosystems and its interactions with dominant vegetation). Increased frequency and duration of drought could impact vegetation ecosystems through changes in soil moisture, which could cause mortality or result in higher species vulnerability to insects and disease. Dominance of nonnative species may be facilitated through more frequent and intense wildfires, causing increased disturbance where native species regenerate more slowly (e.g., sagebrush species). Consequentially, the dominance of nonnative plants could themselves encourage more frequent wildfires and cause changes in the ecology of vegetation assemblages (Halofsky et al. 2018).

Whitebark pine has suffered widespread mortality throughout its range from the combined effects of mountain pine beetle outbreaks and white pine blister-rust infection. Although it is not a dominant species in the area, it is a candidate species and an important tree species to high-elevation ecosystems of western North America (see Section 3.10.3.2.1, Endangered Species Act Threatened, Endangered, Candidate, and Proposed Species). Fire exclusion amplifies the climate change impacts from insects and disease by allowing succession to shade tolerant species, stressing mature whitebark pines, and limiting opportunities for seedling establishment. Projected warming and drying trends will likely further exacerbate this decline (Fryer 2002).

3.4.3.3.7 Wetlands and Riparian Resources

Changes in groundwater levels in wetlands can reduce groundwater inflow, leading to lower water table levels and altered wetland water balances. These altered water table elevations and streamflow volumes may affect riparian areas and their plant communities by reducing hydrological connectivity between uplands and riparian areas. Climate-induced changes in precipitation, drought, and streamflow would influence the distribution of riparian vegetation via changes in local hydrological regimes, especially if summer base flows decrease. If water table elevation can be assumed to be in equilibrium with water levels in the stream, reduced base flows could result in lower riparian water table elevations and subsequent drying of streamside areas, particularly in wide valley bottoms. Wetland and riparian plant communities will respond to climate-induced changes in hydrological variables differently as a function of species composition (Halofsky et al. 2018).

3.4.3.3.8 Fish Resources and Fish Habitat

Warmer air temperatures causing decreased snowpack and reduced stream flows can dramatically influence stream temperature and a host of ecosystem processes. Between 1976 and 2015 average August stream temperatures in the western U.S. showed a warming trend of 0.17°C (0.31°F) per decade. These temperatures are predicted to increase an average of

0.72°C (1.3°F) by 2040 and 1.4°C (2.6°F) by 2080 (Isaak et al. 2017). These warmer water temperatures and lower flows are expected to threaten salmon, trout, and other coldwater fish (EPA 2016). For species dependent upon cold water, such as the threatened bull trout, even small rises in temperature can significantly reduce spawning success (Knowles and Gumtow 1996). Additionally, increased wildfire may cause more extensive geomorphic disturbances and debris flows into streams, contributing to more variable environments and declining fluvial connectivity of aquatic habitats (Halofsky et al. 2018). Although the length of connected habitat needed to support cold water fish populations varies by local conditions, current estimates suggest a minimum of 20 to 30 miles for bull trout (30 miles is associated with a 90 percent probability of occupancy) and 3 to 6 miles for cutthroat trout (6 miles is associated with a 90 percent probability of occupancy) (Halofksy et al. 2018). Added to other stressors, such as habitat loss and fragmentation, invasive species, and disease, warmer stream temperatures could impact current spawning and rearing habitat (U.S. Fish and Wildlife Service 2010).

3.4.3.3.9 WILDLIFE AND WILDLIFE HABITAT

The complex habitats and communities that have been established by many species in the analysis area are being disrupted by climate change. The region is currently facing unprecedented rates of change in climatic conditions that may outpace the natural adaptive capacities of several native species (Halofsky et al. 2018). Increased climate variability and frequency of extreme conditions will favor species adapted to frequent disturbance, potentially increasing the abundance of invasive species. Impacts to terrestrial species as a result of climate change are already being experienced through habitat loss and fragmentation, physiological sensitivities, alterations in the timing of species life cycles (e.g., seasonal changes impacting migration, hibernation, and reproductive success), and indirect effects (e.g., disruption of species interaction across communities). Most species are expected to exhibit sensitivity to changes in the climate, especially those restricted to high elevations or surface water habitats. Of the special status wildlife species occurring in the analysis area, the flammulated owl (*Otus flammeolus*), wolverine (*Gulo gulo*), and Columbian spotted frog (*Rana luteiventris*) are expected to be the most vulnerable terrestrial populations in the region (Halofsky et al. 2018). Other special status species expected to be impacted include the Canada lynx (*Lynx canadensis*) and Rocky Mountain bighorn sheep (*Ovis canadensis*) (Halofsky et al. 2018).

3.4.3.3.10 TIMBER RESOURCES

Timber resources are an important ecosystem service (the natural environment providing benefits to humans) in the area. Forests in the interior Northwest are experiencing rapid change due to increasing wildfires and insect and disease damage, largely attributed to a changing climate (May et al. 2018). Changing climatic conditions are predicted to more than double the area in the Northwest burned by forest fires during an average year by the end of the 21st Century. An increase in wildfires would likely decrease the amount of timber available for harvests and degrade the soil, as well as threaten homes and pollute the air (EPA 2016). The area of pine forests in the Northwest infested with mountain pine beetles is expected to increase due to climate change over the next few decades, which also could lead to decreased timber harvests (EPA 2016).

Higher temperatures and decreased water availability can make trees more susceptible to pests and disease; consequentially, trees that have been damaged or killed burn more readily than living trees. Increases in spring and summer temperatures in recent decades are hypothesized to have increased the frequency of large fire seasons since the 1980s. An earlier snowmelt due to warmer temperatures can lead to greater drying of soils and vegetation, creating opportunities for earlier and larger wildfires (Westerling et al. 2006). Combined with other stressors exacerbated by climate, the rate of change in vegetation assemblages may be accelerated, reducing the productivity and carbon storage in most systems.

3.4.3.3.11 LAND USE AND LAND MANAGEMENT

Long-term temperature and other climatic changes may potentially affect how lands in the analysis area are used. The majority of the analysis area is National Forest System lands, which is frequently used for recreational purposes. Climate change may impact recreational use of the land by changing the range and types of species present through changing habitat conditions (e.g., water quality, temperatures, and streamflow), as well as accessibility for both humans and animal species to various areas through disturbance of roadways or degradation of habitat (e.g., avalanches, flooding, landslides, and wildfires).

3.4.3.3.12 ACCESS AND TRANSPORTATION

Higher annual average temperatures, extreme weather events such as heavy rainfall and extreme heat, as well as changes in freeze/thaw patterns and snowpack dynamics, can add stress to roadways and other infrastructure (e.g., bridges and culverts). Higher temperatures can add chronic damage to infrastructure systems, while extreme weather events can cause sudden catastrophic failures. Additionally, warmer overall temperatures could result in fewer freeze-thaw cycles, which could be beneficial to road longevity and minimize impacts from extreme heat and weather events. Roads and other infrastructure that are near or beyond their design life are at the highest risk to damage from flooding, geomorphic disturbances (e.g., landslides), and avalanches (Halofsky et al. 2018). An increase of these events could impact access to and infrastructure within the analysis area (e.g., floods, landslides, or avalanches washing out roads, bridges and culverts).

3.4.3.3.13 CULTURAL RESOURCES

Several archaeological sites have been identified in the analysis area, including sites within the Stibnite Historic District. Some aspects of climate change may exacerbate damage and loss of cultural resources in the analysis area. Increasing wildfires, flooding, melting of snowfields, and erosion can uncover, displace, or destroy artifacts and other cultural or historic resources before they have been identified. Additionally, large disturbances as a result of climate change can alter the condition of vegetation, streams, and other landscape features valued by native populations (Halofsky et al. 2018).

3.4.3.3.14 PUBLIC HEALTH AND SAFETY

Impacts from climate change on public health and safety could be experienced through poor air quality from wildfires, decreased water quality from lower streamflows, more frequent extreme heat events, as well as the hazards associated with flooding or other severe weather from more frequent extreme weather events. Additionally, wildfires, extreme heat, and weather events could impact worker health and their ability to perform work outside, while warmer winter temperatures may create safer and more comfortable working conditions.

3.4.3.3.15 RECREATION

The changing climate is expected to alter the supply of and demand for outdoor recreation opportunities. Recreational use patterns could be impacted by variable precipitation and rising temperatures, and by the change in conditions that may alter the characteristics and ecological condition of recreation settings. For example, warmer temperatures may affect individual decisions to visit a certain area, and warmer stream temperatures may affect the quantity and quality of aquatic populations for recreational fishing. Higher temperatures and decreased snowpack would affect winter activities dependent on cold temperatures and snowfall, such as skiing and snowmobiling. Other activities may benefit from longer warm and dry seasons (e.g., hiking, camping, mountain biking), but the need for supplemental resources to manage and maintain these recreational areas for a longer period of time may cause personnel and budgetary issues (Halofsky et al. 2018).

3.4.3.3.16 SCENIC RESOURCES

Changing climatic conditions could affect viewers experience of the landscape within the analysis area. Large portions of the analysis area have been affected by wildfires, shifting the landscape from homogenous and continuous even-aged timber stands to a mosaic of tree species and structural conditions. In much of the area, stand-replacing fire have occurred, and other portions of the area have experienced understory surface fire while maintaining timbered overstory. This landscape is dependent on wildfire for regeneration with a stand-replacing fire-return interval of approximately 90 to 100 years. Climate change may increase the frequency, but frequent wildfires decrease fuel loading and fire severity. Additionally, fire return intervals in lethal and mixed regimes range from 75 to 130 years; however, small low intensity fires would likely occur with more frequency due to climate change (Halofsky et al. 2018).

3.4.3.3.17 SOCIAL AND ECONOMIC CONDITIONS

Changing climatic conditions could affect the viability of local communities. Communities near the analysis area are rural and rely heavily on tourism and the trade industry to support their economies. The social and economic conditions of the area could be both negatively or positively impacted by climate-induced changes in recreational use (e.g., degraded water quality and low streamflow could decrease recreational use, but increased temperatures could create longer seasons for recreating); however, it is difficult to discern the potential magnitude of these impacts on current socioeconomic conditions. Climate change also could increase the social and economic cost of some public services, such as road repair and transportation infrastructure maintenance, as a result of increased damages caused by extreme weather events; however, the impacts of climate change on infrastructure could add trade employment to the area.

3.4.3.3.18 ENVIRONMENTAL JUSTICE

Environmental justice populations, such as the tribal communities in the analysis area, are disproportionally vulnerable to climate change impacts (U.S. Global Change Research Program 2016). There are no census tract block groups in Valley and Adams counties that meet the definition of an environmental justice community; however, the Nez Perce Census County Subdivision, Fort Hall Reservation (reservation of the Shoshone-Bannock Tribes), and Duck Valley Reservation (reservation of the Shoshone-Paiute Tribes) and are considered environmental justice populations (see Section 3.22, Environmental Justice). The tribes also use these lands as a part of their traditional use areas. The viability of the environmental justice communities could be impacted by climate change, as it may exacerbate vulnerability to health threats, economic disadvantages, and social inequity (U.S. Global Change Research Program 2016). Environmental justice populations commonly do not have equitable access to resources to help cope with or adapt to changing environmental conditions, such as air conditioning for more frequent extreme heat events.

3.4.3.3.19 SPECIAL DESIGNATIONS

Areas of special designations in the analysis area include wilderness, Wild and Scenic Rivers, Inventoried Roadless Areas, and Research Natural Areas. Although climate change would not directly impact the designations, it could potentially affect the environmental conditions within these areas. Changes in resource availability and quality, or changes to characteristics in these areas could indirectly impact the designations of these areas.

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3.5 Soils and Reclamation Cover Materials

3.5.1 Introduction and Scope of Analysis

Soils provide support for complex food webs and habitat components, and maintenance of soil quality is important for soil-hydrologic functions such as water quality, surface water retention, and groundwater recharge (U.S. Forest Service [Forest Service] 2003). In addition, soils salvaged prior to construction and mining activities can provide important materials that may be used to reclaim disturbed areas. This section presents a description of the existing soils in the Stibnite Gold Project (SGP) area, including areas previously disturbed and reclaimed by historical mining and related activities. The focus of information in this section is the presentation of soil landscapes, soil types, suitable and unsuitable soils for use/re-use, and general characterizations of six broad areas of potential disturbance at the proposed mine site.

The analysis of existing soils in this affected environment section focuses on the proposed mine site and Burntlog Route locations, where field survey/soil investigation was conducted (Midas Gold Idaho, Inc. [Midas Gold] 2017a,b; Tetra Tech 2017, 2019). However, part of the analysis of environmental consequences associated with soils (Section 4.5, Soils and Reclamation Cover Materials) includes two specific terms from the Payette National Forest Land and Resource Management Plan (Payette Forest Plan) (Forest Service 2003) and Boise National Forest Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2010a) that further define the analysis area for soils: Total Soil Resource Commitment (TSRC) and detrimental soil disturbance (DD):

- **Total Soil Resource Commitment (TSRC)**, as defined in the Payette Forest Plan and Boise Forest Plan, is the conversion of a productive site to an essentially non-productive site for a period of more than 50 years. Mining excavations and dumps, roads, dedicated trails, parking lots, and other dedicated facilities (e.g., landfills, borrow sites, surface water management features, etc.) are examples of TSRC. Productivity on these areas range from 0 to 40 percent of natural background.
- **Detrimental soil disturbance (DD)**, as defined in the Payette Forest Plan and Boise Forest Plan, is the alteration of natural soil characteristics that results in immediate or prolonged loss of soil productivity and soil-hydrologic conditions. DD can occur from soil that has been displaced, compacted, puddled (e.g., ruts with berms in mineral soil), or severely burned. Mining excavations and dumps, roads, parking lots, and other dedicated facilities are excluded from this requirement, which are assessed for TSRC. DD does apply to vegetation clearing activities (such as for new and upgraded utility corridors) in areas that are available for multiple uses on National Forest System (NFS) lands.

These two terms, which are discussed and defined in greater detail in Chapter 4, Environmental Consequences, Section 4.5, Soils and Reclamation Cover Materials, result in two defined analysis areas for soil resources. The Payette Forest Plan requires TSRC to be measured across an all-inclusive activity area, and not just within a proposed disturbance footprint. The subwatersheds within which disturbance from the SGP components would occur were chosen as the smallest logical land area (where the effect being analyzed could be expected to occur) for the TSRC analysis area. Hydrologic units of the U.S. are defined by the U.S. Geological Survey using Hydrologic Unit Codes, and the sixth level of classification of these units, subwatersheds, are the smallest unit of analysis. This analysis area was selected as it is a reasonable extent to which some of the potential indirect effects of the SGP might extend, such as soil erosion and sedimentation. The TSRC analysis area only includes NFS lands (management of TSRC by the Forest Service does not apply to private lands) within the subwatersheds in which SGP components would occur. Excluded from the TSRC analysis area are Inventoried Roadless Areas, Research Natural Areas, Wilderness, and private land ownership (including private patented mining claims owned or controlled by Midas Gold) (**Figure 3.5-1**).

For the DD analysis area, DD is measured within the specific area where proposed actions may have detrimental soil impacts but excludes dedicated uses such as roads and mining facilities, which are covered under the TSRC analysis area. Thus, the DD analysis area excludes all the proposed mine site, access roads, and offsite facilities, and focuses only on the transmission line right-of-way (ROW) on NFS lands where vegetation clearing could occur (**Figure 3.5-1**). It also should be noted that some of the transmission line ROW would be considered in the TSRC analysis (e.g., access roads, construction laydown, and structure work areas serving the proposed mine site), and thus is encompassed by the TSRC analysis area. The entire transmission line ROW that is within NFS lands is depicted as the DD analysis area in **Figure 3.5-1**.

3.5.2 Relevant Laws, Regulations, Policies, and Plans

3.5.2.1 36 Code of Federal Regulations 228.8

Mining operations on NFS lands are required by these regulations to reclaim disturbed surfaces in a timely manner, where practicable, by taking measures to prevent or control on-site and off-site damage to the environment (Requirements for environmental protection: Reclamation, 36 Code of Federal Regulations 228.8[g]).

3.5.2.2 Forest Service Manual 2840

Forest Service Manual (FSM) 2840 – Reclamation, directs that lands disturbed by mining must be returned to a use consistent with long-term forest land and resource management plans. Plans of operations must include specific proposals to reclaim all lands disturbed by mining and address topsoil management (FSM 2840, Section 2841). Measurable performance standards are to be included for all reclamation requirements. A bond or other financial guarantee is normally required to cover the full cost of reclamation. Reclaimed areas may not always achieve the range of desired conditions described in Forest Service management direction.

3.5.2.3 Forest Service Manual 2550

The FSM guidelines on soil management (FSM 2550) require that NFS land be managed to maintain or improve soil quality (Forest Service 2010b). Soil quality is related to the functions that soils perform, including biodiversity, water storage, nutrient cycling, carbon storage, physical stability and support, and filtering and buffering. TSRC and DD generally result in physical, chemical and/or biological changes to soils which impair one or more of these functions. In the context of reclamation, improvement of soil quality and related soil functions should be a primary objective. Practical methods to ensure that reclamation cover materials are suitable are summarized in the guidelines.

3.5.2.4 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for soils and include various objectives, guidelines, and standards for this purpose."

3.5.2.5 Idaho Administrative Procedure Act 20.03.02

The Idaho Department of Lands regulates surface mining in Idaho on private and patented land. The Surface Mining Act of 1971 and implementing regulations require that land used for surface mining is reclaimed when mining is completed, meaning the mining operation must return the land to a "productive condition" (Idaho Administrative Procedure Act regulations, Section 20.03.02).

The Idaho Department of Lands has published a manual of Best Management Practices for Mining in Idaho (1992), which provides techniques and approaches for maintaining water quality and completing reclamation projects. This manual also is referenced in the Payette Forest Plan management direction (Mineral and Geology Resources) as a guide for evaluating the completeness of reclamation plans with respect to mitigating water quality effects.

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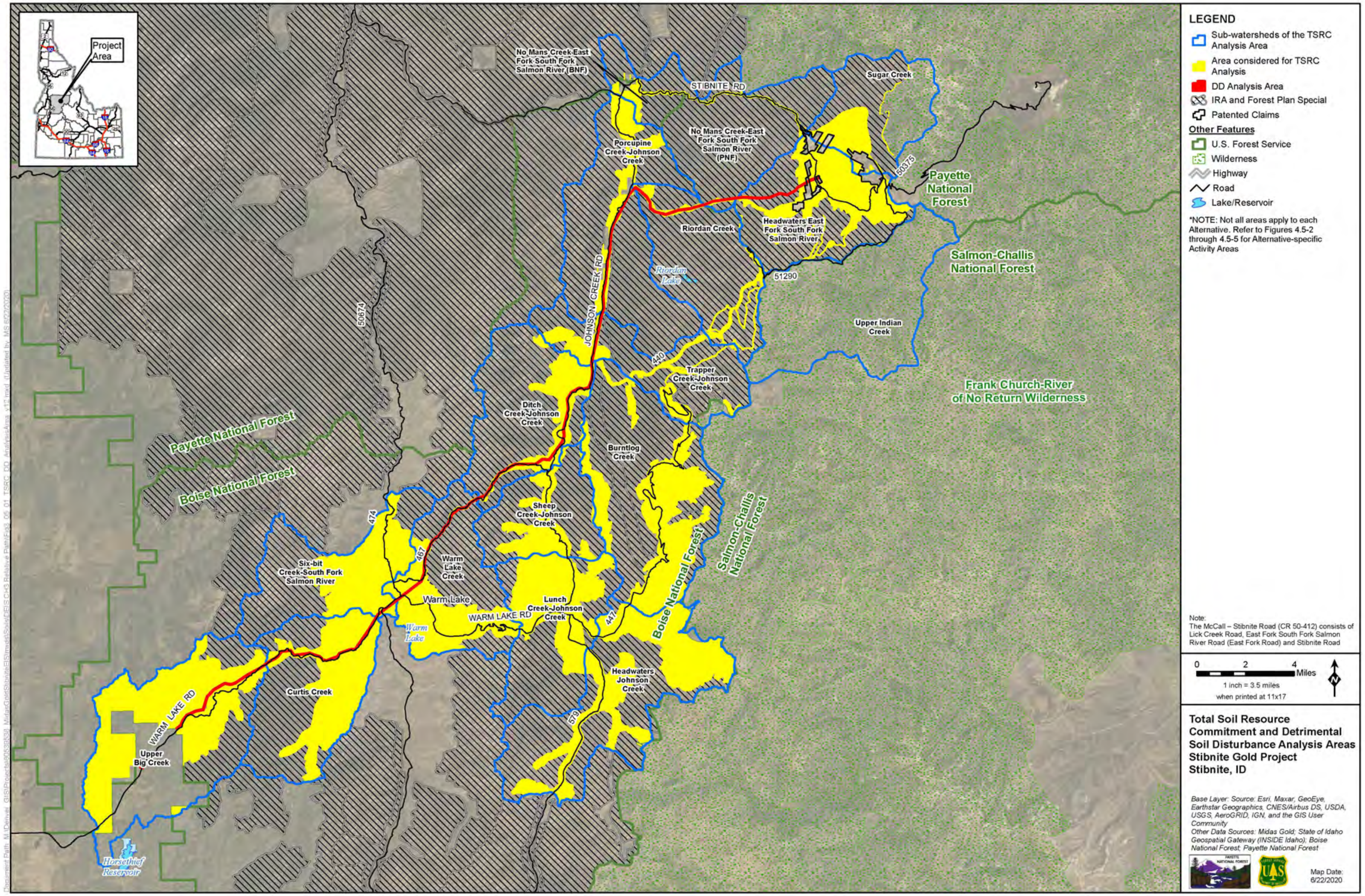

Figure Source: AECOM 2020

Figure 3.5-1 Total Soil Resource Commitment and Detrimental Soil Disturbance Analysis Areas

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3.5.3 Existing Conditions

3.5.3.1 Soil Landscapes

The mine site is in the Salmon River Mountains, a high-relief mountainous physiographic province in central Idaho. It is located approximately 14 road miles east/southeast of the village of Yellow Pine, Idaho, in a drainage that is part of the East Fork South Fork Salmon River (EFSFSR). The terrain around the mine site consists of narrow valleys surrounded by steep mountains. The proposed mine site rests at an elevation of approximately 6,500 feet above mean sea level. Elevations along valley floors range from 6,000 to 6,600 feet above mean sea level. The surrounding mountains reach elevations of 7,800 to 8,900 feet above mean sea level.

Soil at the proposed mine site is generally characterized as weakly developed and coarse textured with a high prevalence of coarse fragments. It has formed in semi-humid, sub-alpine environments. The dominant parent materials are residual and colluvial material sourced from two main bedrock types: Paleozoic metamorphic rock and younger igneous intrusive rock of the Cretaceous Idaho Batholith. Igneous intrusive rock is much more prevalent in the SGP area. Metasediments (generally quartzite or marble) are only mapped in the vicinity of the proposed West End pit. Bedrock depths are typically deep in alluvial valley bottoms and on side slopes that have a mantle of glacial till, outwash, or colluvium. Very steep, glaciated valley walls typically have bedrock at the surface or at shallow depths. Surface cobbles, stones, and boulders also are locally prevalent, along with bedrock outcrops. While most common on very steep slopes, very stony surfaces also cover approximately 81 acres (5 percent) of the mine site with slopes less than 45 percent (Tetra Tech 2017).

There are many different types of soils, and each one has unique characteristics, like color, texture, structure, and mineral content. Residual soils form slowly as rock (the parent material) weathers in place. Organic matter decays and mixes with inorganic material (rock particles, minerals, and water) to form soil. Soil is made up of distinct horizontal layers, referred to as "horizons." The A horizon is typically called topsoil. Seeds germinate and plants root mostly in this horizon. The B horizon is often called the subsoil. It contains clay and mineral deposits (like iron, aluminum oxides, and calcium carbonate) that leach out of the layers above and accumulate in the B horizon. The C horizon is called the substratum. It typically consists of slightly broken-up bedrock. There are few plant roots, and very little organic material is found in this layer. Below this layer is the R horizon, which is the unweathered rock (bedrock) layer that is beneath all the other layers.

In the SGP area, thin, poorly developed surface and subsurface layers (A, A/C and C horizons) have formed on steep slopes (30 to 80 percent gradient) where surface creep is evidenced by J-shaped trees. This soil has been interpreted to be generally stable unless it is disturbed or has its vegetative cover removed (Forest Service 1981, 1994). Approximately 677 acres, or 39 percent, of the mine site is considered to have very steep slopes (greater than 45 percent) (Tetra Tech 2017).

Soil development and thickness of A and B horizons is strongly correlated with slope position in the SGP area. In general, upper side slopes and ridge tops (runoff or convex positions) experience more erosion and have weaker soil development and shallower soils. Lower side slopes, foot slopes, and toe slopes (concave positions) experience more deposition and have deeper soil development. Mid slopes or backslopes (transitional areas) experience both erosion and deposition and have intermediate soil development.

The mine site is in the Stibnite Mining District, with prospecting dating back to the late 1800s. Mining began in the 1920s and continued intermittently through 1997. This historical use of the area has resulted in a wide variety of soils modified by human activity throughout the mine site and vicinity, with approximately 244 acres at the proposed mine site considered highly disturbed (Tetra Tech 2017).

3.5.3.2 Soil Types

Soils in the SGP area are generally young, poorly developed, and often occur on steep slopes. This means their physical and chemical characteristics are often closely associated with the underlying parent materials.

Three basic types of parent materials are present:

- Residuum and colluvium developed in bedrock. Intrusive igneous bedrock of the Idaho Batholith is dominant in the SGP area. The granitic bedrock varies in composition, hardness, and degree of weathering. Weathering products are generally coarse-grained and have a high percentage of coarse fragments.

  Metasedimentary rocks (primarily quartzite and marble) are exposed in and southeast of the West End and Yellow Pine pit areas. The weathering products of quartzite can be similar to granitic rocks, while those of marble tend to be finer grained with chemistry strongly influenced by calcite.

  Alpine glacial erosion has added to the complexity of the landscape. Colluvial materials or slope wash of varying depths are often present even on many of the steep slopes. Soils developed in place from granitic bedrock can have land use and management constraints when located on very steep slopes. These soils also typically have low productivity due to low water-holding capacity, slight to high acidity, and low fertility.

- Alpine glacial till on lateral and ground moraines and glacial outwash in valley bottoms and lower side slopes of glacial troughs. Isolated pockets of glacial till also may be present in depressions on some upper slopes. The depth of the till and outwash varies across the landscape. The till and outwash are generally derived from igneous intrusive rocks that weather to coarse-grained soils. Some areas of till also have a very stony surface and can occur on steep slopes.

- Alluvium on floodplains and terraces adjacent to streams. These are generally deep, well-sorted, loamy or sandy soils. Some areas may be poorly drained.

The geomorphic setting of the SGP area has resulted in a very complex pattern of soils across the landscape, depending on the presence/absence and depth of the glacial till, colluvium, alluvium, and the composition of the bedrock. The disturbance history also has added another layer of complexity. Pronounced changes in soil properties may occur across short distances. This variability is documented in the Soil Hydrologic Reconnaissance Reports (each land type unit includes two to four unique soil types) (Forest Service 1974, 1972, 1969) and the surface soil texture maps developed for the Soil Resources Baseline Study (Midas Gold 2017a). The Soil Resources Baseline Study used field transects based on a 100-meter systematic grid. Soil texture often varied considerably over short distances.

A map of dominant soil types at the mine site is provided on **Figures 3.5-2** and **3.5-3**. **Figures 3.5-4** and **3.5-5** provide a map of dominant soil types along the proposed Burntlog Route. A summary description of mapped soil types and the extent mapped at the mine site and along the Burntlog Route is provided in **Table 3.5-1**, and detailed descriptions are provided later in this section. While the soil mapping is based on the Reclamation and Closure Plan (Tetra Tech 2019), the map unit descriptions incorporate information from the Soil Salvage Report (Tetra Tech 2017), the Soil Resources Baseline Study (Midas Gold 2017a), and the Forest Service mapping (Forest Service 1974). The Soil Resources Baseline Study provides extensive field descriptions of the upper 12 inches of soil in the mine site and vicinity, primarily for soil texture and evidence of disturbance such as compaction, burning, or erosion.

Baseline soil and surface characterization are presented below for the six broad areas of potential disturbance from the Soil Resources Baseline Study that generally correspond to the various proposed mine site areas (i.e., Meadow Creek, Fiddle Creek, Hangar Flats, Yellow Pine, West End, and Infrastructure Areas). Soil map units and layers are rated as either suitable or unsuitable for reclamation based on the suitability criteria in Table 3-1 of the Soil Salvage Report (Tetra Tech 2017). Suitable soils are further rated as either good, fair, or poor for reclamation in **Table 3.5-2**. Suitable soils rated as good generally have loamy soil textures, few coarse fragments, slightly acidic to slightly alkaline pH, and occur on level to gently sloping ground. Unsuitable soils have either very high coarse fragment content; are extremely acidic or very strongly alkaline; or occur on very steep slopes. Soils with a high proportion of surface stones, and soils disturbed by legacy mining activities also are considered unsuitable for reclamation.

3.5.3.2.1 SUITABLE SOILS

Soil map unit number fOD is coarse-silty, mixed, frigid oxyaquic dystrocryepts formed in alluvium in drainage bottoms near stream channels. These soils are very deep (>60 inches). This soil has varying mean seasonal temperatures, is saturated but may not be hydric, and typically supports evergreen tree growth in alpine and subalpine communities. Depth to water is between 12 and 24 inches and fluctuates seasonally as indicated by redoximorphic soil features observed in the soil profile. Texture of these soils is silt, loam, silt loam, sandy loam, and loamy sand. Generally, these soils have high organic matter content in the upper soil layers and are suitable as sources for salvage assuming groundwater elevations are reduced. An average depth of 30 inches is available for soil borrow in this map unit.

Table 3.5-1 Dominant Soil Types in the Proposed Mine Site and Burntlog Route

Map Unit[1]	Soil Description[2]	Dominant Soil Suborder[3]	Particle Size Class[4]	Solum Depth[5] (inches)	Depth to Extremely Cobbly or Gravelly Material(inches)[6]	Extent Mapped (acres)
mTC	A	Orthents	Sandy/Loamy-Skeletal	8	15	749
sTC	A	Orthents (stony)	Sandy/Loamy-Skeletal	8	15	112
S45+	A	Orthents (very steep)	Sandy/Loamy-Skeletal	8	15	611
fOD	B	Cryepts	Coarse-Silty	15	30	90
fTH	C	Saprists	Decomposed organic material	>30	>30	89
AoD	D	N/A	N/A	N/A	N/A	442
Other Unsalvageable	N/A	N/A	N/A	N/A	N/A	172

Table Source: AECOM 2020; Midas Gold 2017a; Tetra Tech 2017, 2019

Table Notes:

1 mTC = mixed typic cryorthents
sTC = stoney typic cryorthents
S45+ = sandy-skeletal/loamy-skeletal, mixed typic cryorthents
fOD = frigid oxyaquic dystrocryepts
fTH = frigid typic haplosaprists
AoD = areas of previous disturbance

2 A Somewhat excessively and excessively drained soils developed in residuum and colluvium derived from igneous intrusive rock (granite, granodiorite, quartz diorite, quartz monzonite, and others). Map unit S45+ includes some areas of previous disturbance (AoD) on slopes greater than 45%.
B Very deep to bedrock, somewhat poorly drained soils developed in recent silty alluvium near stream channels.
C Very deep to bedrock, poorly and very poorly drained soils developed in organic materials in foot slope and toe slope positions subject to groundwater seepage.
D Areas of Previous Disturbance – No Salvageable Soil.
N/A = not available

3 From *Soil Taxonomy* (U.S. Department of Agriculture, Natural Resources Conservation Service 1999). Orthents (Entisols) have less soil development compared to Cryepts (Inceptisols). Orthents typically have a surface A horizon over a C horizon composed of weathered granitic material. Cryepts also have a subsurface B horizon with evidence of soil development. Saprists (Histosols) typically have highly decomposed organic materials deeper than 16 inches.

4 Skeletal classes have >35 percent (%) coarse fragments. Sandy = loamy sand or sand textures. Loamy = generally loam, sandy loam, and silt loam textures with <35% clay. Coarse-Silty has <35% coarse fragments, <15% fine sand or coarser, and <18% clay.

5 The solum includes all soil layers that have undergone soil forming processes, including the O, A, AC, and B horizons. It excludes the C horizon.

6 Estimated at >60% coarse fragments by volume.

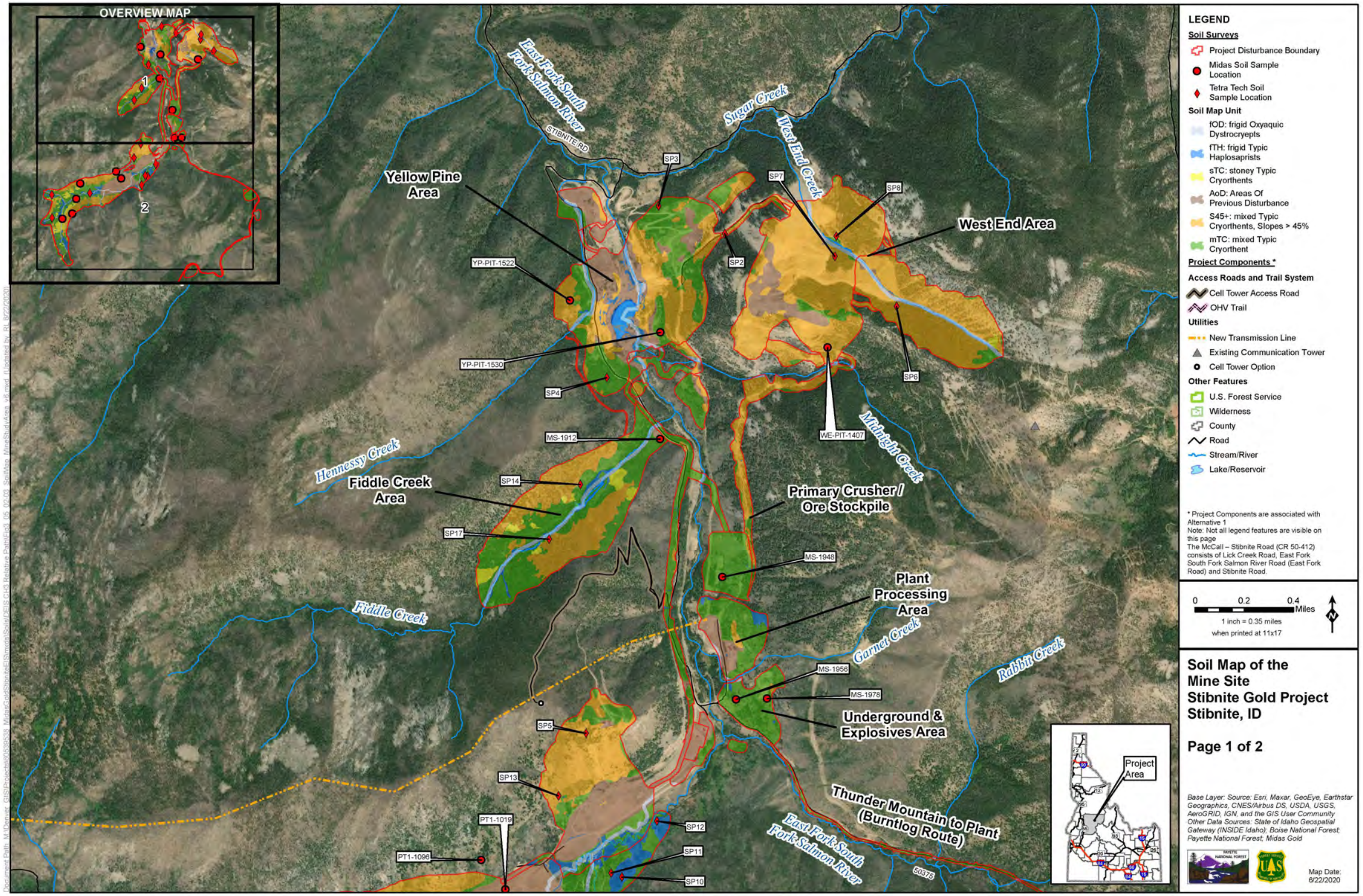

Figure Source: AECOM 2020

Figure 3.5-2 Soil Map of the Mine Site – Page 1 of 2

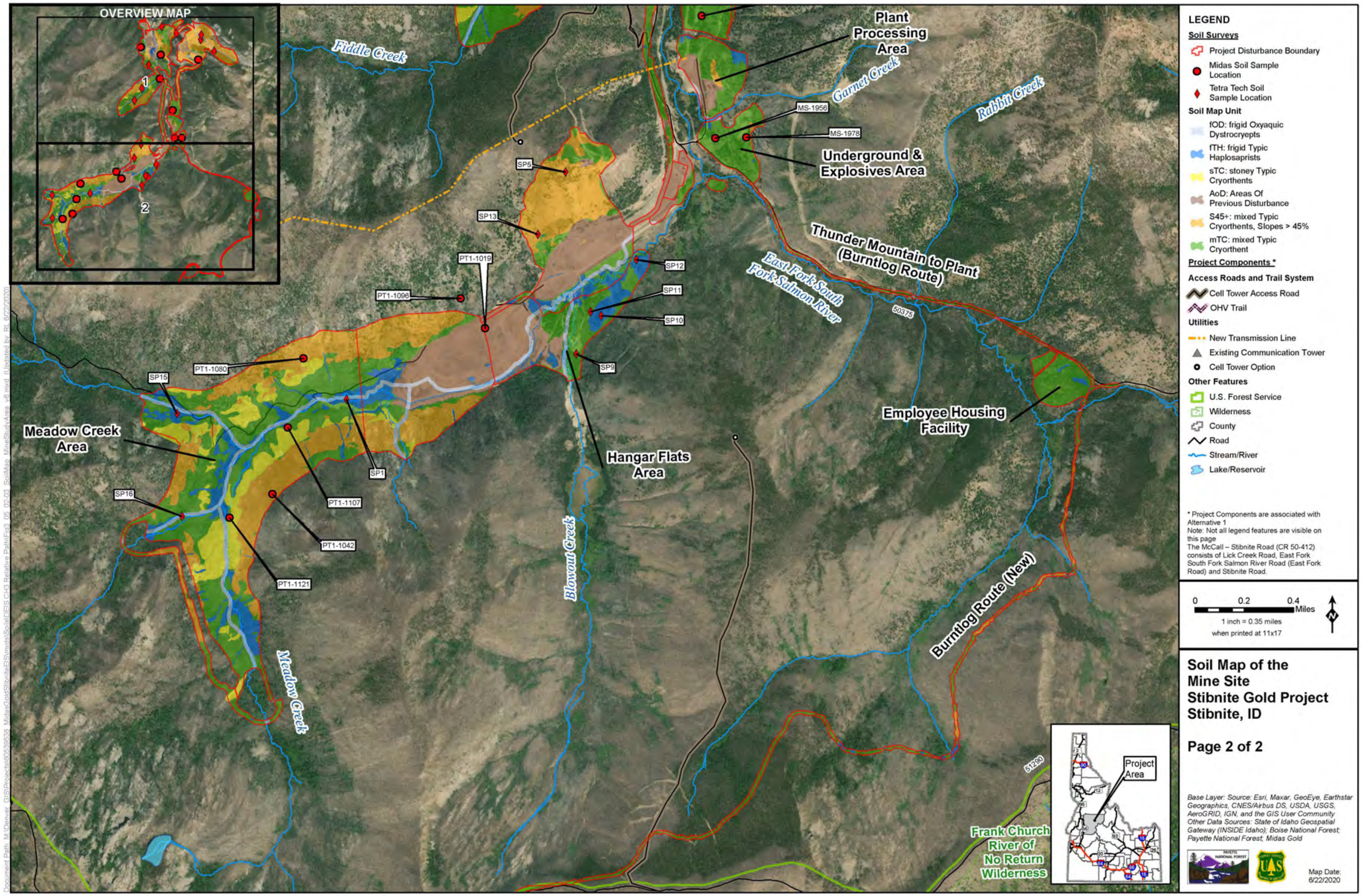

Figure Source: AECOM 2020

Figure 3.5-3 Soil Map of the Mine Site – Page 2 of 2

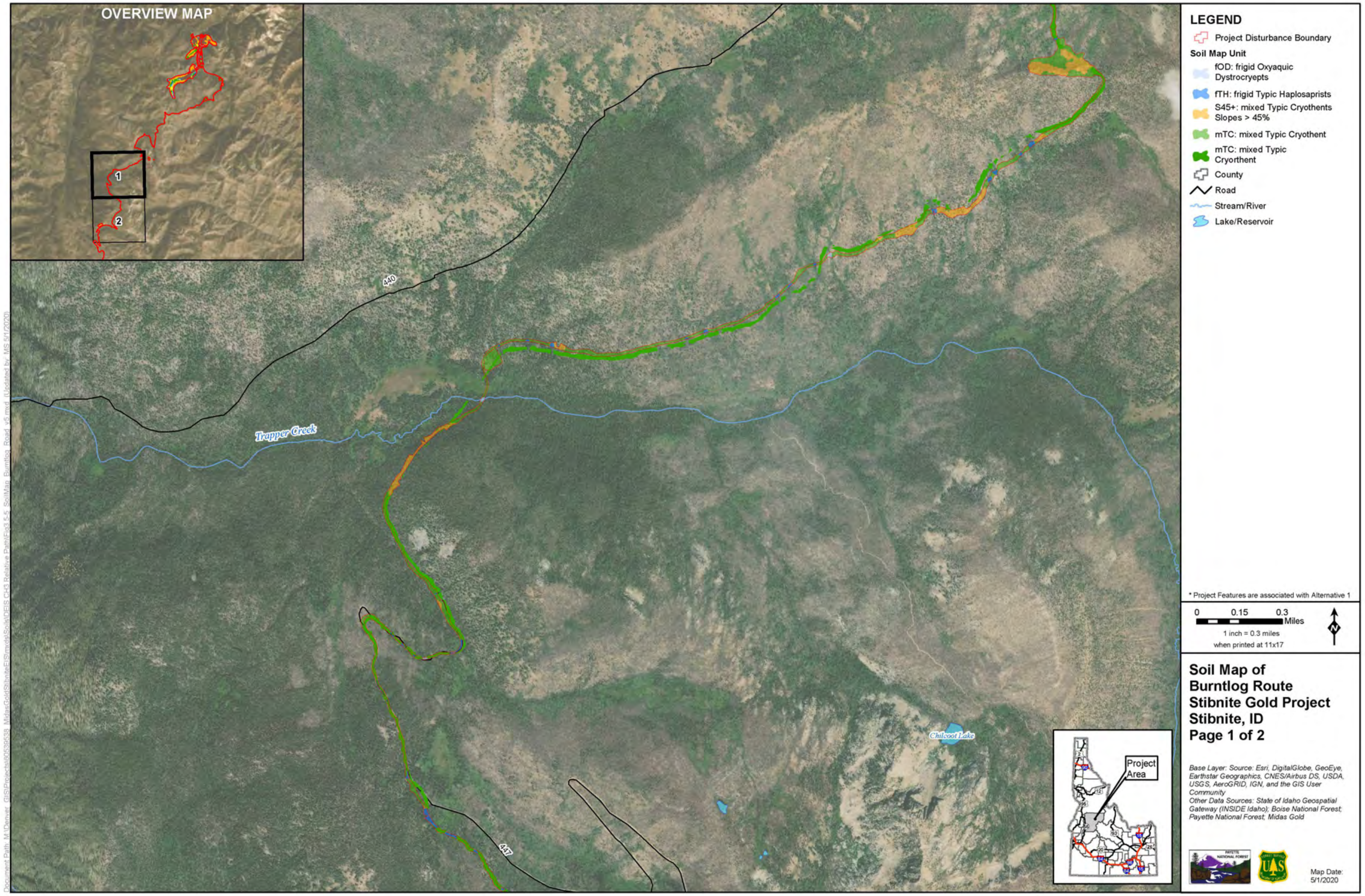

Figure Source: AECOM 2020

Figure 3.5-4 Soil Map of Burntlog Route – Page 1 of 2

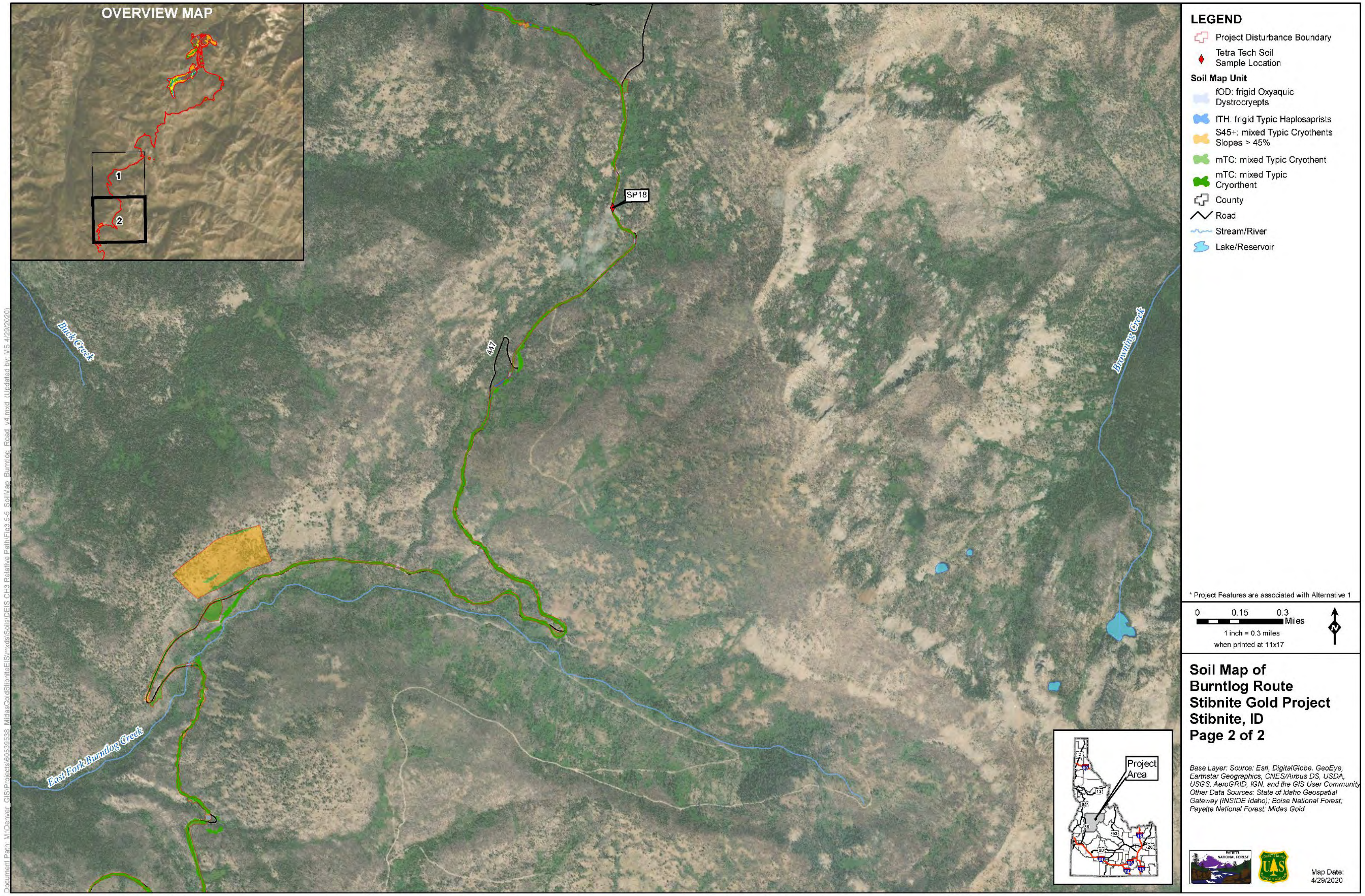

Figure Source: AECOM 2020

Figure 3.5-5 Soil Map of Burntlog Route – Page 2 of 2

Soils from map unit fTH are euic, frigid typic haplosaprists meaning these soils lack definitive horizons, have elevated pH, and have varying mean seasonal temperatures. These soil types were observed on side slopes adjacent to the fOD soils. These soils develop by the accumulation and subsequent decomposition of organic matter in forested settings and lack the mineral soil layers and sandy textures found in the fOD soils. These soils are high in organic matter, occur on shallow to moderate slopes resulting from seeps, and are suitable as salvage material. An average depth of 36 inches is available for soil borrow in this map unit.

Soil pedons described in the sandy-skeletal/loamy-skeletal, mixed typic cryorthents (mTC) are classified as either sandy-skeletal or loamy-skeletal and are derived from slope colluvium or residuum. These soils have a fine loamy texture, typically have above freezing temperatures, and occur on steep slopes. Soils in this map unit were typically dug to 20 inches or less because of the high percentages of coarse fragments increasing with depth. Geotechnical investigations indicate these soils are very deep with surficial material varying in thickness from a few to over 40 feet (SRK Consulting 2012). Thin A horizons transitioning to C horizons are common in this map unit. No evidence of subsurface soil horizon development as required to identify a B horizon was observed. An average depth of 18 inches is available for soil borrow in this map unit.

3.5.3.2.2 Unsuitable Soils

Sandy-skeletal/loamy-skeletal, mixed typic cryorthents, (S45+) soil consists of sandy loam soil with a seasonal mean temperature regime and slopes greater than 45 percent, which are unsuitable for salvage. Characteristics of this soil are a thin A horizon underlain with C horizon material with high coarse fragment content increasing with depth and often over 60 percent (Midas Gold 2017a; Tetra Tech 2019). There are bedrock outcrops. Vegetation is sparse. Soils are similar to soil map unit mTC, but steep slopes make this map unit unsuitable for salvage.

The stoney typic cryorthents (sTC) soil unit is composed of high surface coarse fragment content—stones, cobbles, boulders, and bedrock outcrops occurring on slopes between 10 and 35 percent. Suitable soil for salvage in this map unit may be 2 to 6 inches in depth. However, the high percentages of large boulders and scree material impede salvage operations.

Areas of previous disturbance (AoD) occur on previous mining activities and include spent heap leach ore storage areas, deposited tailings, development rock dumps, and open pits. These materials are deemed unsuitable for salvage.

The suitability criteria in **Table 3.5-2** are applied to the mine site map units in **Table 3.5-1**.

Table 3.5-2 Reclamation Cover Materials Suitability Ratings for Mine Site Soils

Soil Map Unit (Depth in inches)	Suitability Rating	Limiting Criteria
fOD (0-12)	Fair	pH 5 to 6
fOD (12-30)	Fair	Coarse fragments 15-30%
fTH (0-12)	Good	None - organic soils
fTH (12-36)	Good	None - organic soils
mTC (0-6)	Fair on slopes <25% Poor on slopes 25-45%	Coarse fragments 15-30%; pH 5-6
mTC (6-18)	Poor	Coarse fragments near 60%
S45+ (all)	Unsuitable	Slope >45%
sTC (all)	Unsuitable	Surface stones, boulders, and rock outcrop
AoD (all)	Unsuitable	Non-soil material related to legacy mining

Table Source: AECOM 2020; Midas Gold 2017a; Tetra Tech 2017, 2019

3.5.3.3 Mine Site

Baseline soil and surface characterization is provided below for the six broad areas of potential disturbance from the Soil Resources Baseline Study (Midas Gold 2017a) that generally correspond to the various proposed mine site areas (i.e., Meadow Creek, Fiddle Creek, Hangar Flats, Yellow Pine, West End, and Infrastructure Areas).

3.5.3.3.1 Meadow Creek

This area includes the Meadow Creek valley floor, lower side slopes, and the surrounding valley walls.

The Meadow Creek valley floor has deep to very deep, loamy-skeletal, sandy-skeletal, coarse-loamy, and coarse-silty soils developed in alluvium, slope wash, and glacial outwash deposits (map units fOD, mTC). Approximately 54 acres of soils are slightly to strongly acid and have a moderate to high amount of organic matter and generally low levels of essential plant nutrients. Deep alluvial soils cover approximately 32 acres. A seasonal high water table and soil saturation is present in much of this area (Midas Gold 2017a). Organic soils (fTH) occur on poorly drained footslope and toeslope positions near seeps and streams above the active floodplain. The glaciated valley walls have weakly developed, loamy-skeletal and sandy-skeletal soils developed in residuum and colluvium derived from weathered granitic bedrock (map units mTc, S45+). Approximately 12 percent of these soils have a high percentage of surface coarse fragments and rock outcrops (sTC) (Midas Gold 2017a; Tetra Tech 2017).

Areas of legacy mining disturbance in the lower Meadow Creek area include Spent Ore Disposal Area, stream diversions, roads, and vehicle trails. Fifty-six acres, or 10 percent of the area, was mapped as disturbed (AoD) (Tetra Tech 2017). High soil compaction was identified in these areas. Natural disturbance in the Meadow Creek area includes historical wildfires and past landslides and avalanches. Soil disturbance classes identified in burned areas were generally class 0 (none) or 1 (low), and legacy mining disturbance zones were class 2 (moderate) or 3 (severe) (Midas Gold 2017a). Soil disturbance classes are defined in the Forest Soil Disturbance Monitoring Protocol (Forest Service 2009). Although wildfires are not considered part of the Forest Soil Disturbance Monitoring Protocol, impacts on the soil are recorded.

3.5.3.3.2 FIDDLE CREEK

The main Fiddle Creek drainage encompasses the lower part of a glacially scoured (cirque) basin and glacial trough walls. The narrow valley floor has coarse-loamy and coarse-silty soils (fOD) developed in alluvium along the stream channel covering approximately 10 acres. The cirque basin and glaciated valley walls have predominantly sandy-skeletal and loamy-skeletal soils (mTC, S45+) developed in colluvium and residuum from granitic bedrock. Rock outcrop and areas of high surface stoniness occur over approximately 5 percent of the area with slopes less than 45 percent. Approximately 4 acres of organic soils (fTH) occur in seepage zones above Fiddle Creek (Midas Gold 2017a).

Two sample locations were investigated in the upper Fiddle Creek area, both receiving laboratory analysis (Tetra Tech 2017). Mineral soil textures were found to be predominantly sandy loam and very gravelly loamy sand. The soils are slightly to strongly acid, have a high content of organic matter in the surface (greater than 4 percent), and generally have low to very low levels of essential plant nutrients. Soil saturation was identified in only a few areas in the valley bottom.

Mapped legacy mining disturbance is minimal. One acre was mapped as disturbed (AoD). Former drill roads and drill pads are largely reclaimed. Areas of natural disturbance include both historical wildfires and former landslides and avalanches. Disturbance classes identified in burned areas were class 0 (none) or 1 (low) (Midas Gold 2017a).

3.5.3.3.3 HANGAR FLATS

This area contains predominantly steep, glaciated side slopes and a portion of the Meadow Creek valley floor.

Ninety-six samples were collected in Hangar Flats area, with seven samples receiving laboratory analysis (Midas Gold 2017a; Tetra Tech 2017). The soils are slightly to strongly acidic, have a moderate to high amount of organic matter in the surface, and generally have low to very low levels of essential plant nutrients. The steep glacial trough walls have weakly developed, sandy-skeletal and loamy-skeletal soils (mTC, S45+) developed in residuum and colluvium from granitic bedrock. The valley floor contains large areas of previous disturbance (AoD) from drilling and mining activities. Native soils are deep to very deep, coarse-loamy, coarse-silty, and loamy-skeletal soils developed in alluvium, glacial outwash, and slope wash. Deep alluvial soils (fOD) cover approximately 13 acres. There is a high percentage of histosols (fTH) in seepage zones totaling approximately 23 acres. A seasonal high water table is present over much of the valley floor and toe-slopes (Midas Gold 2017a).

Areas of legacy mining disturbance include a Spent Ore Disposal Area, Bradley tailings, smelter, mill site, historical creek diversions, private access roads on the hillside, and partially reclaimed zones on the valley floor from past drilling and mining and associated activities. Eighty-two acres, or 35 percent of the area, was mapped as disturbed (AoD) (Tetra Tech 2017). High soil compaction was identified in these areas by the Soil Resources Baseline Study. Natural disturbance in the Hangar Flats area includes historical wildfires and past landslides and avalanches. Soil disturbance classes identified in burned areas were generally class 0 (none) or 1 (low), whereas legacy mining disturbance zones were class 2 (moderate) or 3 (severe) (Midas Gold 2017a).

3.5.3.3.4 YELLOW PINE

Yellow Pine area contains predominantly steep, dissected mountain slopes on the east side, glaciated valley wall on the west side, and the EFSFSR valley floor in between.

Soil conditions were investigated at 73 locations in this area, with five samples receiving laboratory analysis (Midas Gold, 2017a; Tetra Tech 2017). The soils are slightly to moderately acidic, have a moderate amount of organic matter, and generally have low to very low levels of essential plant nutrients. The steep east- and west-facing slopes have weakly developed, loamy-skeletal and sandy-skeletal soils (mTC, S45+) developed in residuum and colluvium from granitic bedrock. The valley floor is mostly disturbed (AoD) by previous mining activities. Undisturbed soils are deep to very deep, loamy-skeletal, sandy-skeletal, and coarse-loamy soils (fOD, mTC) developed in alluvium and slope wash. Deep alluvial soils cover approximately 10 acres. Histosols (fTH) cover approximately 8 acres. A seasonal high water table is present adjacent to stream courses.

Past mining activity in this area is extensive and includes the historic Yellow Pine pit/lake and associated mine benches, waste rock dump, old drill and mine access roads, building sites, and underground portals. Recontouring has occurred in the reclaimed Homestake area (i.e., the northeast portions of the Yellow Pine area). These areas were identified using Light Detection and Ranging and aerial photographs, with little to no soil cover present. Forty acres, or 20 percent of the area, was mapped as disturbed (AoD) (Tetra Tech 2017). Thirty-six percent of the Yellow Pine area has slopes greater than 45 percent (S45+), a large portion of which also are disturbed. Evidence of wildfire was only present in the southwest portion of this area. Disturbance classes identified in burned areas were generally low (Midas Gold 2017a).

3.5.3.3.5 WEST END

This area is characterized by steep, dissected mountain slopes. Midnight Creek and West End Creek flow through the area and have created sharply incised channels. Much of this area has been disturbed by previous mining operations (AoD).

Undisturbed soils are predominantly sandy-skeletal and loamy-skeletal (S45+) developed in colluvium and residuum from metasedimentary rocks (predominantly quartzite). Deep alluvial soils (fOD) cover approximately 10 acres. Sixty sample locations were recorded in this area, with five samples receiving laboratory analysis (Midas Gold 2017a; Tetra Tech 2017). Surface soil textures in undisturbed areas were predominantly very gravelly loamy sand, loamy sand, sandy loam, and loam. The soils are slightly to strongly acidic, have a moderate to high amount of organic matter, and generally have low to very low levels of essential plant nutrients.

Past mining activity in this area is extensive and includes multiple mining pits, haul roads, access roads, waste rock dumps, and areas of deep backfill. Surface materials are bare rock or backfill. These areas were identified using Light Detection and Ranging and aerial photography, with little to no natural soil cover present. Twenty-three acres, or 8 percent of the area, was mapped as disturbed (AoD) (Tetra Tech 2017). Eighty-four percent of the West End area has slopes greater than 45 percent (S45+), a large proportion of which also are disturbed. There was no evidence of wildfire in this area.

3.5.3.3.6 INFRASTRUCTURE AREAS

These areas are where most proposed mine site support infrastructure and facilities would be located, including the plant processing area, crusher, ore stockpile, truck shop, water treatment plant, underground and explosives area, worker housing facility, growth media stockpiles, and haul roads. These areas are predominantly within the EFSFSR valley floor and adjacent fan terraces and lower side slopes. Most of these areas have been previously disturbed (AoD) by mining activities.

One hundred and fourteen (114) sample locations were established in undisturbed soil areas, with 6 samples receiving laboratory analysis (Midas Gold 2017a). Surface soil textures were predominantly loamy-skeletal, sandy-skeletal, and coarse-loamy soils (mTC, fOD) developed in alluvium, glacial outwash, slope wash, and colluvium. Deep alluvial soils cover approximately 6 acres, primarily along haul road routes. Organic soils (fTH) cover approximately 5 acres and were observed in poorly drained areas near seeps and streams with saturation identified in a few (Midas Gold 2017a). The soils are slightly to strongly acidic, have a low to moderate amount of organic matter, and generally have low to very low levels of essential plant nutrients (Midas Gold 2017a).

Areas of existing disturbance include historic town sites, reclaimed haul roads, and mine access and infrastructure areas that show high soil compaction, as well as current roads, parking lots, laydown areas, and camp buildings. Thirty-two acres, or 12 percent of the areas, were mapped as disturbed (AoD) (Tetra Tech 2017). Areas of natural disturbance also exist, caused by both historical wildfires and former landslides and avalanches. Disturbance classes identified in burned areas were generally class 1 (low) to class 0 (none), whereas areas disturbed by past mining were class 3 (severe) or class 2 (moderate) (Midas Gold 2017a).

3.5.3.4 Access Roads

Geology and geomorphic features of the proposed Burntlog Route were investigated, and the bedrock geology and geomorphology were found to be very similar to those described for the mine site. Granitic bedrock underlies most of the route, with a few inclusions of volcanic and metasedimentary rock (Midas Gold 2017b). The area has been glaciated, creating narrow u-shaped valleys with steep sides and flat valley bottoms.

The route is characterized by weakly developed, loamy-skeletal and sandy-skeletal soils (mTC, S45+) developed in residuum and colluvium from granitic bedrock. Deep alluvial soils (fOD) and histosols (fTH) make up approximately 8 percent of the route, occurring in drainageways and slope seepage zones. It is assumed that 40 percent of the mTC soil map unit would be practically salvageable using heavy equipment (Tetra Tech 2019).

3.5.3.5 Utilities

No soils field investigations occurred for the existing or proposed transmission line ROW. The corridor crosses through 35 different land types on NFS lands. Mapping is available in the Soil Hydrologic Reconnaissance Reports (Forest Service 1969, 1972, 1974).

3.5.3.6 Off-site Facilities

Locations of off-site facilities include either the Landmark or Burntlog Maintenance Facility (depending on which alternative is selected) and the Stibnite Gold Logistics Facility. The Landmark Maintenance Facility would be constructed on a previously disturbed borrow site. The soils are mapped as mTC (**Table 3.5-1**) (Tetra Tech 2017). The Burntlog Maintenance Facility would be located in one of the access roads borrow source locations (4.4 miles east of the junction of Johnson Creek Road and Warm Lake Road along the proposed Burntlog Route), The Stibnite Gold Logistics Facility would be constructed on an alluvial fan terrace above Big Creek. Soils are mapped as Donnel sandy loam, 2 to 4 percent slopes (U.S. Department of Agriculture, Natural Resources Conservation Service 2017). These are well drained soils formed in alluvium weathered from granite. They have sandy loam textures in the solum, over stratified loamy sand and sandy loam starting below 20 inches. A seasonal high-water table is greater than 80 inches below the ground surface. Minor inclusions in the map unit include poorly drained soils in the floodplain. The Stibnite Gold Logistics Facility would be located on private land.

3.5.3.7 Existing Total Soil Resource Commitment

As defined in Section 3.5.1, Introduction and Scope of Analysis, TSRC is the conversion of a productive site to an essentially non-productive site for a period of more than 50 years. Mining excavations and dumps, roads, dedicated trails, parking lots, and other dedicated facilities (e.g., landfills, borrow sites, surface water management features, etc.) are examples of TSRC. As shown previously in **Figure 3.5-1**, the activity area for TSRC has been defined as NFS lands within the subwatersheds within which the SGP takes place.

Existing TSRC within the 16 subwatersheds encompassing where disturbance associated with the SGP would occur (**Table 3.5-3**) was mapped with the use of a geographic information system (ArcGIS) with relevant digital spatial layers including Lidar-generated terrain maps, aerial photographs, road and trail layers, and previous mapping of disturbed areas. Additional mapping details and methodology of existing TSRC is provided in **Appendix G-1** (TSRC Methodology) and figures depicting existing TSRC are provided in **Appendix G-2** (TSRC Analysis Figures) and in Chapter 4, Environmental Consequences, Section 4.5, Soils and Reclamation Cover Materials.

Table 3.5-3 Analysis Area Subwatersheds, Activity Area, and Existing Total Soil Resources Commitment

Subwatershed	Subwatershed (acres)	Activity Area (acres)	Existing TSRC in Activity Area (acres)	Percent Existing TSRC in Activity Area
Headwaters East Fork South Fork Salmon River	15,974	5,034	171	3%
Sugar Creek	11,497	2,021	57	3%
No Man's Creek-East Fork South Fork Salmon River[1] (Payette National Forest)	17,885	413	31	1%
No Man's Creek-East Fork South Fork Salmon River[1] (Boise National Forest)	1,837	516	11	2%
Porcupine Creek-Johnson Creek	21,516	2,796	78	3%
Riordan Creek	14,411	883	17	2%
Trapper Creek-Johnson Creek	12,129	2,518	37	1%
Ditch Creek-Johnson Creek	16,222	3,628	48	1%
Burntlog Creek	25,194	9,417	99	1%
Sheep Creek-Johnson Creek	10,403	3,178	28	1%
Lunch Creek-Johnson Creek	15,414	7,322	98	1%
Headwaters Johnson Creek	23,385	10,305	89	1%
Warm Lake Creek	15,093	6,820	160	2%
Six-Bit Creek South Fork Salmon River	15,087	7,105	63	1%
Curtis Creek	17,476	8,280	74	1%
Upper Big Creek	18,436	13,429	103	1%

Table Source: AECOM 2020

Table Notes:

1 The eastern portion of the No Man's Creek-East Fork South Fork Salmon River subwatershed is within the Payette National Forest and the western portion is in the Boise National Forest.

TSRC=Total Soil Resource Commitment.

3.5.3.8 Existing Detrimental Soil Disturbance

As defined in Section 3.5.1, Introduction and Scope of Analysis, DD is the alteration of natural soil characteristics that results in immediate or prolonged loss of soil productivity and soil-hydrologic conditions. Areas considered for TSRC are excluded from this requirement, but DD applies to vegetation clearing for new and upgraded utility corridors in areas that are available for multiple uses on Forest Service lands. The activity area for DD has been defined as the new and upgraded transmission line corridor where it occurs on NFS lands. Existing DD within the transmission line ROW is estimated at 8 percent. This is a very rough estimate based on average extent of DD from ground-based forest harvesting operations in the Forest Service Northern Region (Reeves et al. 2012).

3.5.3.9 Soil Contamination/Chemistry

The proposed mine site occurs in an area containing numerous highly mineralized zones, and natural background concentrations of some metals are known to be relatively high in some soils and regolith (i.e., the unconsolidated material below the soil profile and on top of bedrock). In addition, elevated levels of arsenic, antimony, and mercury have been observed in soils contaminated by legacy mining operations (URS Corporation 2000). Some known locations of contamination were previously remediated, but it is possible that additional areas of contamination would be exposed and observed during SGP-related construction, operations, and closure and reclamation. Midas Gold evaluated 4,828 exploration soil samples collected from undisturbed areas adjacent to the mine site. The mean concentrations of antimony (11.63 parts per million [ppm]) and mercury (0.94 ppm) from the samples[1] are high but are still within the highest screening-level phytotoxicity criteria concentrations from various literature references and federal agencies in U.S. and Canada cited in the Reclamation and Closure Plan (Tetra Tech 2019). The mean concentration of arsenic (94.40 ppm) from the samples is five times higher than the U.S. Environmental Protection Agency's ecological soil screening level for arsenic and nearly twice as high as the highest screening-level phytotoxicity criteria concentration from other various sources (Tetra Tech 2019). A principal concern regarding the re-use of soil and rock at the mine site is the high metals concentrations that may remain and complicate revegetation plans for reclaimed areas. Total arsenic was identified as having the greatest potential for phytotoxicity in plants growing on reclaimed (and historical) mine lands at the mine site.

[1] It should be noted the samples were not analyzed using EPA-approved methodologies for environmental analysis. Samples were analyzed using exploration lab methodologies that have more aggressive extraction methods (resulting in potentially higher concentration outputs), which are not typically compared to these environmental screening levels.

3.6 NOISE

3.6.1 Introduction and Scope of Analysis

Noise is typically characterized as unwanted sound. Because the natural existing ambient sound is generally not considered a problem, it is not typically classified as noise. The ambient sound level is a composite of sound from all sources, including the natural background and anthropogenic sources. When measured the ambient sound is the total sound received by the microphone of a sound level meter. Existing ambient sound levels are often the starting point for analyzing project-associated noise impacts, because such environmental noise analysis typically compares project-associated noise to either existing ambient or natural background sound based on applicable adverse effect or impact assessment criteria. This section addresses the affected noise environment as it is related to humans and human activity. Effects of noise on non-human species is addressed in sections related to fish resources and fish habitat and wildlife and wildlife habitat (Sections 3.12, 3.13, 4.12, and 4.13).

The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of each day and throughout the week and year. This variation is caused not only by various noise source activities, but also by changing weather conditions, effects of seasonal vegetative ground cover, presence of ice or flowing water from nearby creeks and rivers, and wind.

Reference examples of outdoor and indoor noise levels are provided in **Table 3.6-1** as context for describing existing conditions. These levels are measured in terms of “A-weighted” decibels (dBA), which are used to quantify sound and its effect on people (U.S. Environmental Protection Agency [EPA] 1978), and emphasize frequencies best heard by humans. The equivalent noise levels (L_{EQ}) is the measured or calculated noise level energy average over a specific period of time (such as 1 hour or 24 hours). Noise levels listed in **Table 3.6-1** represent Day-Night sound levels (L_{DN}), an energy-averaged value over a 24-hour period that reflects increased sensitivity to noise when people are usually sleeping.

Table 3.6-1 Examples of Noise Levels

Outdoor	Noise Levels (dBA, L_{DN})	Indoor
Jet flying over at 1,000 feet	100	Rock band
Gas lawn mower at 3 feet	90	Blender at 3 feet
Next to busy highway	88	
0.75-mile from touchdown at major airport	86	Garbage disposal at 3 feet
Noisy urban area during the day	70	Vacuum cleaner at 10 feet
Wooded suburban residential	51	Refrigerator at 3 feet
Rural residential	39	
Wilderness Ambient	35	Library

Table Source: Caltrans 2009; EPA 1978

Table Notes:

dBA = A-weighted decibel

L_{dn} = Day-night sound level, expressed in dBA

The analysis area for noise includes areas within a 5-mile radius of the major Stibnite Gold Project (SGP) components (i.e., mine site, access routes, utilities, and off-site facilities) (**Figure 3.6-1**). This is the analysis area for noise because noise levels attenuate (i.e., decrease) as a function of the distance from the source (i.e., divergence), ground absorption, atmospheric conditions, and the presence of physical barriers. Due to these factors noise levels will vary throughout the analysis area.

The following general terms are used in the noise analysis to describe different types of sound:

- **Noise** – Typically, unwanted sound
- **Ambient sound** – The combination of sound from all sound sources, natural or man-made, at any specific time or place.
- **Background sound** – The sound level that already exists before or without the SGP.
- **SGP-attributed sound** – Any sound produced by the SGP that was not already part of the existing background sound.
- **Baseline plus SGP Sound** – The energy sum of the existing background sound and the SGP-attributed sound. All other things remaining equal, the baseline plus SGP sound level would become the new ambient sound if the SGP was implemented.

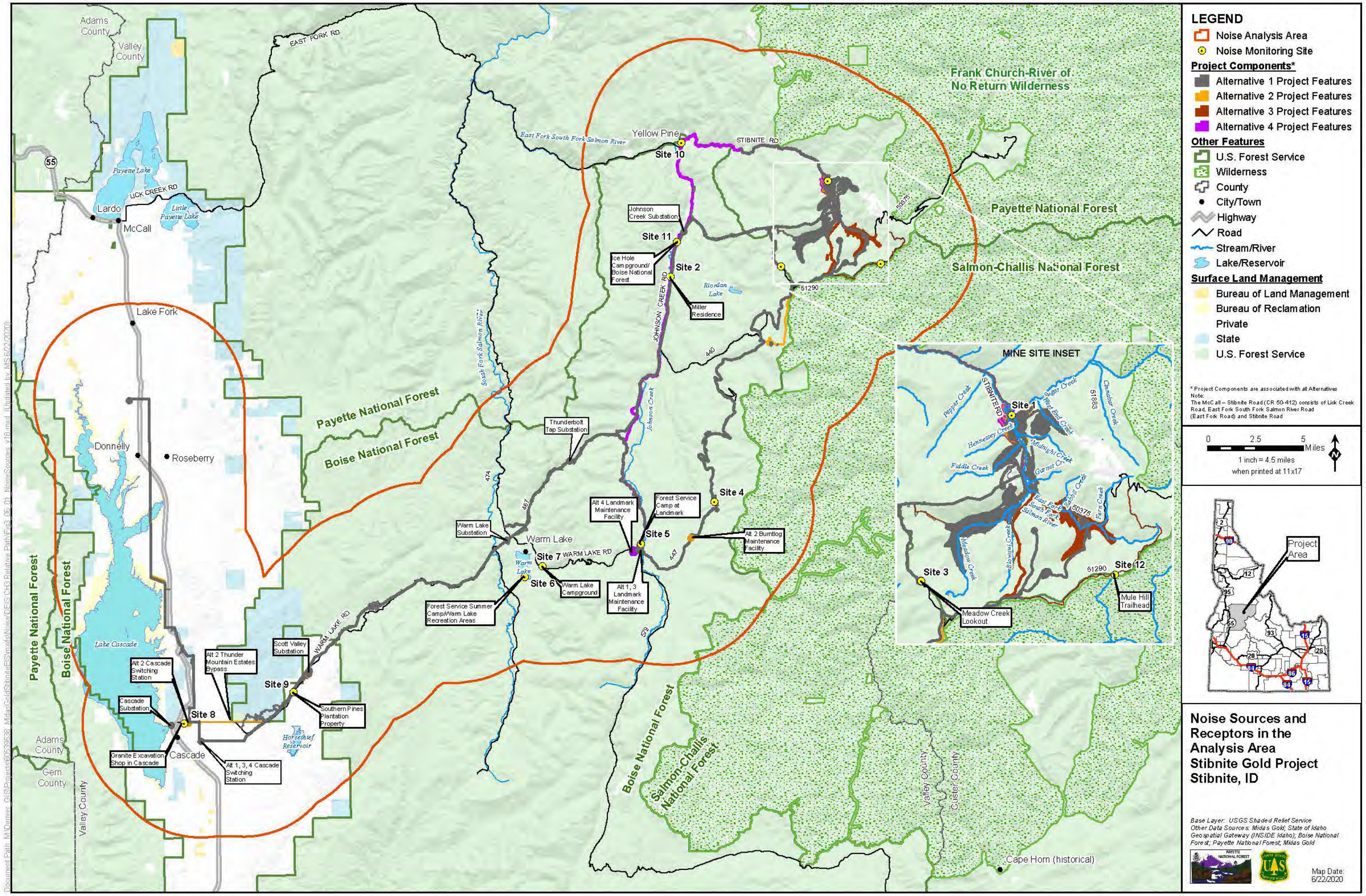

Figure Source: AECOM 2020

Figure 3.6-1 Noise Sources and Receptors in the Analysis Area

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3.6.2 Relevant Laws, Regulations, Policies, and Plans

3.6.2.1 Federal Regulations

The Noise Control Act of 1972 established a national policy to promote an environment free from noise that jeopardizes public health or welfare. The Noise Control Act directed the EPA to identify acceptable limits under various conditions that would protect public health and welfare with an adequate margin of safety. EPA published a summary of these acceptable limits in 1978, as follows:

- Average hourly noise level (L_{EQ1h}) of less than or equal to 55 dBA for outdoor areas where people spend limited amounts of time, such as school yards or playgrounds.
- Day-night noise level (L_{DN}) of less than or equal to 55 dBA for outdoor areas at residences, farms, and other areas where people spend varying amounts of time, where quiet is a basis for the use of such areas.

However, EPA stressed that the protective levels should "not be viewed as standards, criteria, regulations, or goals. Rather, they should be viewed as levels below which there is no reason to suspect that the general population will be at risk from any identified effects of noise" (EPA 1978). Therefore, the EPA levels are guidance levels rather than enforceable standards or regulations. The EPA guidance levels do not apply to biological resources such as fish and wildlife. Methods used to evaluate noise impacts to fish and wildlife are discussed in Section 3.12, Fish Resources and Fish Habitat, and Section 3.13, Wildlife and Wildlife Habitat.

3.6.2.2 EPA Guidance on Ambient Noise Levels

Guidance on safe noise levels, which can be used to assess impacts of a project on public health and welfare, is available from EPA (1974, 1978). **Table 3.6-2** shows outdoor and indoor noise levels identified by EPA to protect public health and welfare, expressed as L_{EQ24h} or L_{DN} (based on the dBA over a 24-hour period). Note that the acceptable noise levels listed in the table are not "peak," but are 24-hour averages over several years. These values are not standards but are levels where the general population would not be expected to be at risk from the identified effects of the noise (EPA 1978).

Table 3.6-2 Yearly Values that Protect Public Health and Welfare with a Margin of Safety

Effect	Safety Level	Area
Hearing Loss	L_{EQ24h} ≤70 dBA	All areas.
Outdoor Activity Interference and Annoyance	L_{DN24h} ≤55 dBA	Outdoors in residential areas and farms, and other outdoor areas where people spend widely varying amounts of time, and other places where quiet is a basis for use.
Indoor Activity Interference and Annoyance	L_{DN} ≤45 dBA L_{EQ24h} ≤45 dBA	Indoor residential areas. Other indoor areas with human activities, such as schools, etc.

Table Source: EPA 1978

Table Notes:

dBA = A-weighted decibel.

L_{EQ24h} = Equivalent sound level for 24-hour period, expressed as dBA.

L_{DN} = Day-night sound level, expressed as dBA.

L_{DN24h} = Day-night sound level, expressed as dBA over a 24-hour period.

3.6.2.3 State Regulations

The Idaho Administrative Procedures Act does not contain regulations relating to environmental noise. Therefore, there are no state noise regulations applicable to the SGP.

3.6.2.4 Local Regulations

There are no applicable local county noise ordinances for Valley County, Idaho.

3.6.2.5 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for noise and include various objectives, guidelines, and standards for this purpose.

3.6.3 Existing Conditions

Describing the existing conditions that would potentially be affected by SGP-related noise involves identifying noise-sensitive receptors, characterizing baseline ambient noise levels, and characterizing landscape features (e.g., terrain, vegetation) that may affect noise transmission.

3.6.3.1 Noise-Sensitive Receptors

The proposed mine site is located in the upper East Fork South Fork Salmon River (EFSFSR) drainage approximately 44 air miles northeast of the City of Cascade, Idaho. The current access from State Highway (SH)-55 to the mine site is via the Warm Lake Road (County Road [CR] 10-579) to Johnson Creek Road (CR 10-413) (in summer) or South Fork Salmon River Road (National Forest System Road [FR] 50674) (in winter), and then Stibnite Road portion of the McCall-Stibnite Road (CR 50-412) (**Figure 3.6-1**).

At the mine site the primary human noise-sensitive receptors (NSRs) would be mine site workers. Outside the mine site, the primary human NSRs would be residents and recreational land uses (e.g., campgrounds, lookouts, trails, dispersed recreational uses in wilderness areas, including undeveloped campsites). Analyzed NSRs are listed in **Tables 3.6-3** and **3.6-4**, for locations with (NSRs 1 through 9) and without (NSRs 10 through 12) baseline noise measurements, respectively.

Table 3.6-3 Baseline Ambient Sound Levels

ID	Name	Baseline Ambient Sound Level (dBA)[1,2]	Location and Existing Noise Characterization
Site 1	EFSFSR Valley	40 L_{EQ1h}	Located in the EFSFSR valley near the proposed mine pit locations to characterize baseline ambient noise levels where mining operations would occur.
Site 2	Miller Residence	50-51 L_{DN}	Located near a residence on Johnson Creek Road (CR 10-413) between Stibnite Road (CR 50-412) and Meadow Creek Lookout site to characterize baseline ambient noise levels near the highway that trucks would use to access the mine site via the temporary YPR[3].
Site 3	Meadow Creek Lookout	45 L_{EQ1h}	Located at the Meadow Creek Lookout site off Meadow Creek Lookout Road (FR 51290) to characterize baseline ambient noise levels in undeveloped areas and near the proposed Burntlog Route[4]; general noise levels in adjacent wilderness areas.
Site 4	Burnt Log Road	40 L_{EQ1h}	Located approximately 100 feet from FR 50447 (Burnt Log Road) to characterize baseline ambient noise levels in undeveloped areas near the proposed Burntlog Route, and for use in characterizing general noise levels in adjacent wilderness areas.

ID	Name	Baseline Ambient Sound Level (dBA)[1,2]	Location and Existing Noise Characterization
Site 5	Forest Service Camp at Landmark	34-40 L_{DN}	Located at a Forest Service campground near Johnson Creek Road (CR 10-413) and Landmark Airfield to characterize baseline ambient noise levels near this higher volume roadway along the Yellow Pine Route where other noise sources (e.g., aircraft) also are present.
Site 6	Forest Service Summer Home/Warm Lake Recreation Areas	34-49 L_{DN}	Located on the southwest shoreline of Warm Lake to characterize baseline ambient noise levels near Forest Service summer home and recreation areas associated with Warm Lake.
Site 7	Warm Lake Road	47-52 L_{DN}	Located approximately 150 feet north of Warm Lake Road (CR 10-579) and directly east of Warm Lake to characterize baseline ambient noise levels along this frequently used road, at Warm Lake Campground, near the proposed Burntlog Route.
Site 8	Granite Excavation Shop in Cascade	61-64 L_{DN}	Located at a commercial shop along Warm Lake Road (CR 10-579) in Cascade, with a residence nearby, to characterize baseline ambient sound levels near the highway.
Site 9	Southern Pines Plantation Property	51-52 L_{DN}	Located approximately 7 miles east of SH 55 along Warm Lake Road (CR 10-579) to characterize baseline ambient noise levels along this frequently used highway near a group of private residences.

Table Source: HDR, Inc. 2017 a,b

Table Notes:

1 Presented hourly L_{EQ} values (L_{EQ1h}) are averaged from daytime (i.e., from 7:00 AM and 10:00 PM) hourly baseline measurement data collected over a period of multiple consecutive days.

2 Presented L_{DN} values are calculated from 24-hour baseline measurement data collected over a period of multiple consecutive days (HDR, Inc. 2017a,b).

3 The proposed Yellow Pine Route is the current summer access from SH 55 to the mine site via Warm Lake Road (CR 10-579), Johnson Creek Road (CR 10-413), and Stibnite Road (CR 50-412).

4 The proposed Burntlog Route includes Warm Lake Road (CR 10-579), FR 447 (Burnt Log Road), Thunder Mountain Road (FR 50375), and a new connector segment from Burnt Log Road (FR 447) to Thunder Mountain Road (FR 50375).

Noise measurement sites 2, 3, 5, 6, 8, and 9 are considered human use NSRs for this analysis because they represent residences or recreational land uses (e.g., campgrounds, lookouts, trails, dispersed recreation uses in wilderness areas, including undeveloped campsites). Site 1 represents ambient sound levels near the mine site. Site 4 is not considered an NSR, but the sound levels measured at Site 4 represent—like the levels measured at Site 3—ambient sound levels in adjacent wilderness areas. Site 7 also is not considered to be an NSR but characterizes traffic noise along Warm Lake Road (CR 10-579).

Residences are located near Warm Lake Road (CR 10-579) in Cascade and approximately 7 miles east of SH 55 on the Southern Pines Plantation Property. Recreational land uses located near Warm Lake Road (CR 10-579) include the Warm Lake Campground, a U.S. Forest Service (Forest Service) summer home, and recreational areas along the southwest shoreline of Warm Lake. These noise-sensitive receptors are in the vicinity of both the Yellow Pine Route and the proposed Burntlog Route.

Several residences, the Forest Service Camp at Landmark, and the Ice Hole Campground, are located near Johnson Creek Road (CR 10-413) between Warm Lake Road (CR 10-579) and Stibnite Road (CR 50-412), with additional residences located near Johnson Creek Road (CR 10-413) in Yellow Pine.

The Meadow Creek Lookout is located just north of Meadow Creek Lookout Road (FR 51290), which would be used to access a proposed portion of the Burntlog Route. The Frank Church-River of No Return Wilderness Area is located east of the proposed Burntlog Route and there are several hiking trails in the vicinity. The closest is the Mule Hill Trailhead (National Forest System Trail #219).

3.6.3.2 Baseline Ambient Noise Level Measurements

Outdoor baseline ambient sound levels were measured at five locations in the analysis area in July and August of 2014 and at four additional locations in July and August of 2016 (HDR, Inc. 2017a,b). **Table 3.6-3** provides a description of each site along with summarized baseline sound levels. The noise measurement locations (Sites 1 through 9) are shown in **Figure 3.6-1**. Sites with assumed nighttime human use, such as residences and campgrounds are reported I dBA, L_{DN}, those with assumed daytime only use are reported in dBA, L_{EQ}.

Three additional locations have been identified as human use NSRs for this analysis. **Table 3.6-4** provides a description of these additional NSRs along with reference baseline sound levels. Measured noise levels were not available for these areas, but baseline levels were estimated based on similarity to other sites with measurements.

Table 3.6-4 Additional Human Use NSRs

ID	Name	Baseline Ambient Sound Level	Location and Existing Noise Characterization
Site 10	Yellow Pine	50-51 L_{DN}	Located in Yellow Pine village. No noise measurements were taken from this site, but baseline sound levels assumed to be similar to Site 2, on the basis of similar distance to shared nearby roadway(s) and proximity of residences.
Site 11	Ice Hole Campground/ Boise National Forest	50-51 L_{DN}	Located at Ice Hole Campground in the Boise National Forest. No noise measurements were taken from this site, but baseline sound levels assumed to be similar to Site 2, on the basis of similar distance to shared nearby roadway.

ID	Name	Baseline Ambient Sound Level	Location and Existing Noise Characterization
Site 12	Mule Hill Trailhead	40-45 L_{EQ1h}	Located at the Mule Hill Trailhead. No noise measurements were taken from this site, but ambient sound levels assumed to be in the range of Site 3 and Site 4 sound levels.

Table Source: AECOM 2020

3.6.3.3 Landscape Features

The mine site is located in the Payette National Forest in the upper drainage basin for the EFSFSR. The mine site area is characterized by narrow valleys surrounded by steep mountains. Elevations along the valley floors range from 6,000 to 6,600 feet above mean sea level. The surrounding mountains and areas in the Frank Church-River of No Return Wilderness area reach elevations over 9,000 feet above mean sea level. Off-site facilities, much of the Burntlog Route, and the transmission line corridor are in the Boise National Forest with a similar topography and terrain. On the western edge of the SGP area, access routes and transmission lines are in wider valley bottoms. Noise levels attenuate (i.e., decrease) as a function of the distance from the source (i.e., divergence), ground absorption, atmospheric conditions, and the presence of physical barriers (i.e., landscape features).

3.7 HAZARDOUS MATERIALS

3.7.1 Introduction and Scope of Analysis

This section addresses hazardous materials other than development rock and process tailings that would be utilized by the Stibnite Gold Project (SGP). Hazardous materials are substances which may pose a risk to human health, wildlife, or the environment. Hazardous materials that would be used and/or transported for the proposed mining activities include diesel fuel, gasoline, lubricants, antifreeze, chemical reagents and reactants (including sodium cyanide and sulfuric acid), antimony concentrate, mercury containing residuals, lime, explosives, and other substances.

When not properly managed, hazardous materials can represent potential risks to human health, the environment, and wildlife. Spills or accidental releases of hazardous materials can impact air, surface water, groundwater, soil, vegetation, wildlife, fish and other aquatic resources and public health and safety; they can occur during transportation to and from a site, during storage and use activities, or through improper disposal of waste materials.

This section reviews the relevant laws, regulations, policies and plans that pertain to the use of hazardous materials at a mine site and evaluates the existing conditions in the SGP area regarding past releases and current use of hazardous materials.

The analysis area for hazardous materials includes:

- The proposed mine site (including all operational areas and haul roads);
- Proposed off-site facilities: Stibnite Gold Logistics Facility and the Maintenance Facility locations. The proposed Stibnite Gold Logistics Facility would be used as a central depot for consolidating loads and deliveries;
- Access roads: Warm Lake Road (County Road [CR] 10-579), from Cascade past the Stibnite Gold Logistics Facility, continuing to Landmark and northeast to the mine site via the proposed Burntlog Route; and the Yellow Pine Route: Johnson Creek Road (CR 10-413) and the Stibnite Road portion of the McCall-Stibnite Road (Stibnite Road; CR 50-412), from the village of Yellow Pine to the mine site; and
- Watershed tributaries of the East Fork South Fork Salmon River (Sugar Creek, Meadow Creek, Johnson Creek, Riordan Creek, Burntlog Creek, and Trout Creek); and tributary streams to the South Fork of the Salmon River (Cabin Creek and Warm Lake Creek).

Figure 3.7-1 presents an overview of the SGP and the mine site, off-site facilities, and access roads which is the analysis area for hazardous materials as described above.

3.7.2 Relevant Laws, Regulations, Policies, and Plans

3.7.2.1 Occupational Safety and Health Administration

The Occupational Safety and Health Administration Hazard Communication (29 Code of Federal Regulations [CFR] 1910.1200) provides a uniform system of labeling and communicating hazards associated with hazardous chemicals.

3.7.2.2 Mine Health and Safety Hazard Communication Standards

The U.S. Department of Labor Mine Safety and Health Administration regulation specifies methods for testing, evaluation and approval of mining products (30 CFR 5 through 36) and procedures for hazard communication which identifies chemicals at the mine, training to determine hazardous chemicals, and establishes a hazardous communication program (30 CFR 47).

3.7.2.3 Idaho Regulations on Hazardous Materials

Idaho enforces regulations on hazardous materials administered through the Idaho Department of Environmental Quality (IDEQ), under Idaho Administrative Code IDAPA 58.01.05 . The regulations are identical to federal rules and incorporated by reference where applicable. (IDAPA 58.01.13 is the state's rules for Ore Processing By Cyanidation which does not have a federal equivalent rule).

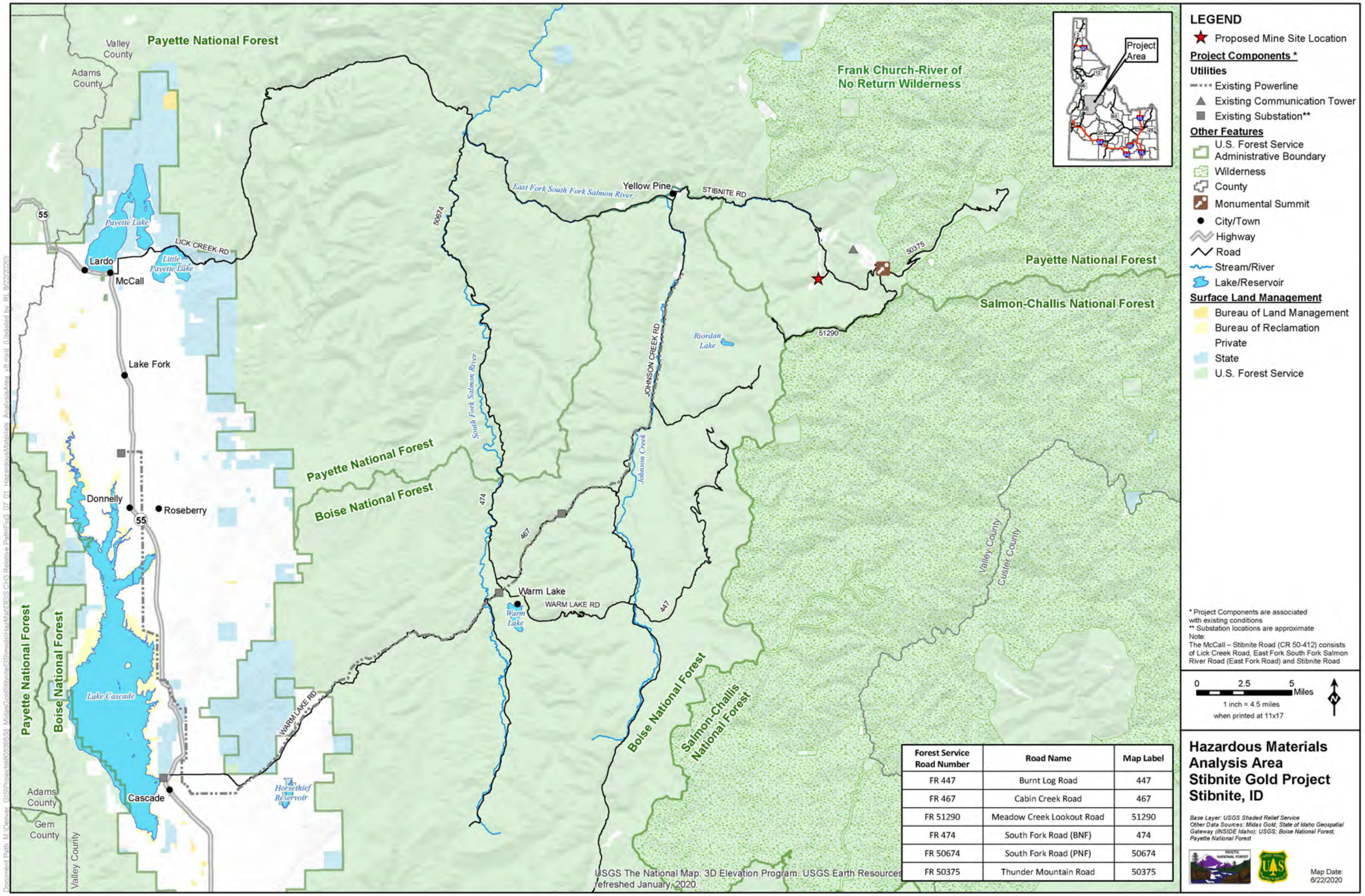
3.7.2.4 U.S. Department of Transportation Hazardous Materials Transportation Permit

The permit governs the transport of hazardous materials as defined by the U.S. Department of Transportation and requires specific employee training and security and contingency planning. The U.S. Department of Transportation regulations in 49 CFR 100-185 define hazardous materials and establish regulations for the safe and secure transportation of hazardous materials in commerce.

Consultation and coordination with the Federal Motor Carrier Safety Administration should be made for shipments of hazardous materials requiring a Hazardous Material Safety Permit, pursuant to 49 CFR 385.403.

3.7.2.5 Idaho Regulations on Hazardous Waste Transport

Idaho Statues Title 49 Chapter 22 regulates the transportation of hazardous wastes in the state. Regulations include requirements for permits, endorsements, insurance, various enforcement provisions including an enforcement fund, and other provisions to ensure safe hazardous waste transport in the state. The permitting process and permits remain state controlled, though Idaho has incorporated several federal regulations by reference and utilizes the federal process and federal forms for implementation.



Forest Service Road Number	Road Name	Map Label
FR 447	Burnt Log Road	447
FR 467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR 474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 50375	Thunder Mountain Road	50375

Figure Source: AECOM 2020

Figure 3.7-1 Hazardous Materials Analysis Area

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3.7.2.6 Department of Justice Bureau of Alcohol, Tobacco, Firearms and Explosives

The agency regulates the sale, possession, transport, storage, security, and use of explosives. The agency also plays a vital role in regulating and educating the explosives industry.

3.7.2.7 The International Cyanide Management Code

The International Cyanide Management Code is a voluntary initiative for the gold and silver mining industries and provides guidelines pertaining to the manufacture, transportation, storage, and use of cyanide. Midas Gold Idaho, Inc. (Midas Gold) has indicated their intent to design and operate the cyanidation facility in compliance with the International Cyanide Management Code.

3.7.2.8 The Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act and its regulations (Superfund, 40 CFR 300-375) establish liability provisions related to the clean- up of hazardous waste sites, accidents, spills and other releases, pollutants, and contaminants to the environment. Hazardous substances are included in 40 CFR Table 302.4, which lists hazardous substances and reportable quantities, including the types of materials used in mining activities.

The Superfund Amendments and Reauthorization Act is an amendment and reauthorization of the Comprehensive Environmental Response, Compensation, and Liability Act to require facilities with hazardous chemicals in quantities above certain thresholds to provide reporting under Title III of the Superfund Amendments and Reauthorization Act. The regulation establishes reporting requirements for any “hazardous substances” and “extremely hazardous substances.” Hazardous substances and petroleum products such as gasoline, diesel, or propane are subject to reporting requirements (Threshold Planning Quantities) under the Emergency Planning and Community Right-to-Know Act, Sections 311 and 312. Extremely hazardous substances are subject to reporting requirements under Section 313.

3.7.2.9 Resource Conservation and Recovery Act

Hazardous wastes, as defined in Subtitle C of the federal Resource Conservation and Recovery Act (RCRA) regulations, are governed by the U.S. Environmental Protection Agency (EPA) in 40 CFR 260-273 and also in the Idaho equivalent state Hazardous Waste Management Act and Idaho Administrative Procedure Act regulations 58.01.05, Rules and Standards for Hazardous Waste. The regulations apply to the generation, storage, transport, and disposal of regulated hazardous waste at the mine site. The types of materials used in mining activities and that would be subject to these requirements could include liquid waste materials with a flash point less than 140 degrees Fahrenheit, spent solvent-containing wastes, and reactive cyanide and corrosive liquids (acids and bases). The identification and listing of hazardous waste is regulated under 40 CFR 261, and also pertains to hazardous waste management to include regulatory program requirements.

3.7.2.10 Oil Pollution Act of 1990

The Oil Pollution Act of 1990 amended the Clean Water Act to address prevention, response, and cleanup for oil pollution incidents. This act requires qualifying oil storage facilities to develop spill prevention, control and countermeasure plans in accordance with 40 CFR 112.

3.7.2.11 EPA Risk Management Plan Rule

Section 112(r) of the 1990 Clean Air Act Amendments sets forth a series of requirements aimed at preventing and minimizing the consequences of accidental chemical releases. These requirements are the basis of a rule on “Risk Management Programs for Chemical Accidental Release Prevention” promulgated by the EPA on June 20, 1996 (40 CFR 68). The rule applies to public and private facilities that manufacture, process, use, store, or otherwise handle regulated substances at or above specified threshold quantities ranging from 500 to 20,000 pounds. The rule requires facilities that use extremely hazardous substances to develop a Risk Management Plan with critical information to assist local fire, police, and emergency response personnel in preparation for and response to chemical emergencies.

3.7.2.12 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition related to hazardous materials transport, use, and disposal and include various objectives, guidelines, and standards for this purpose.

3.7.3 Existing Conditions

The SGP area has been extensively disturbed by past activities. Historic activities involved the use of hazardous materials including, but not limited to, diesel, gasoline, jet fuel, lubricants, hydraulic oils, chemical reagents, including sodium hypochlorite, sodium hydroxide, copper sulphate, lead acetate, and cyanide (Bradley et al 1943).

Mining history in the area spans from the late 1800s to present: Meadow Creek Mine from 1919 to 1938; Yellow Pine Mine from 1937 to 1952; relatively little mining activity from 1953 to 1978;mining activities by Hecla Mining Company at the Yellow Pine pit and Bradley-era stockpiles from 1978 to 1998. Other former operators include Louisiana Land and Exploration Company, Canadian Superior Mining (U.S.) Ltd., El Paso Mining and Milling, Rancher’s Exploration Company (Ranchers), Twin Rivers Exploration, MinVen Corporation, Pioneer Metals

Corporation, Barrick Gold Corporation (formerly American Barrick Resources), and Stibnite Mines. Inc.

A more extensive summary of mining history in the area is presented in the Stibnite Gold Project Hazardous Materials Baseline Study (HDR, Inc. [HDR] 2017), which was prepared in 2015 and updated in 2017. Legacy mining features and related activities are shown on **Figure 3.7-2**.

Current exploration includes activities at Yellow Pine pit, West End pit, and Hangar Flats from 2011 to present.

3.7.3.1 Mine Site

Current exploration-related activity is occurring in the three major identified deposits at the mine site: Yellow Pine, West End, and Hangar Flats (**Figure 2.3-2**, Alternative 1 Mine Site Layout) as well as those areas as defined in the Golden Meadows Exploration Project Plan of Operations (Midas Gold 2011, 2016a).

Centrally located support facilities for these exploration activities include the personnel camp, offices, maintenance shop area, a helipad and hangar, and an airstrip.

In the course of day-to-day exploration activities, Midas Gold currently stores and uses various substances classified as hazardous materials. These include petroleum products (e.g., fuels, lubricants, and motor oils), over-the-counter cleaning agents, batteries, tires, and other routine materials used to support drill rigs, generators, water pumps, vehicles, helicopters, and other operating needs (HDR 2017).

Existing fuel infrastructure for the exploration activities consists of a primary fuel storage area, a secondary fuel storage area, the shop area, and the hangar fuel storage area. **Table 3.7-1** summarizes petroleum use and storage locations at the existing exploration operations. The primary fuel storage area includes four double-walled, 10,000-gallon aboveground storage tanks (ASTs); two double-walled, 4,000-gallon ASTs within tertiary containment; and two single-walled, 500-gallon ASTs within secondary containment. The primary fuel storage area is covered. The secondary fuel storage area is located near the shop and includes two double-walled, 2,500-gallon gasoline ASTs (**Figure 3.7-3**). The shop area fuel storage area includes two double-walled, 500-gallon used oil ASTs and three generators. The primary diesel generator is located at the personnel camp northwest of the shop area (**Figure 3.7-3**). The other two generators at the shop area are used as backup power generation for offices and water facilities. Southwest of the shop area is the hangar fuel storage area which includes one 5,000-gallon AST and one 2,500-gallon AST for storage of Jet A fuel. In addition, there are mobile ASTs associated with drums of heating oil located in emergency tents around the site. The location of the emergency tents varies depending on activities. There also are fly tanks used for helicopter-supported fueling of remote drill rigs and other miscellaneous equipment.

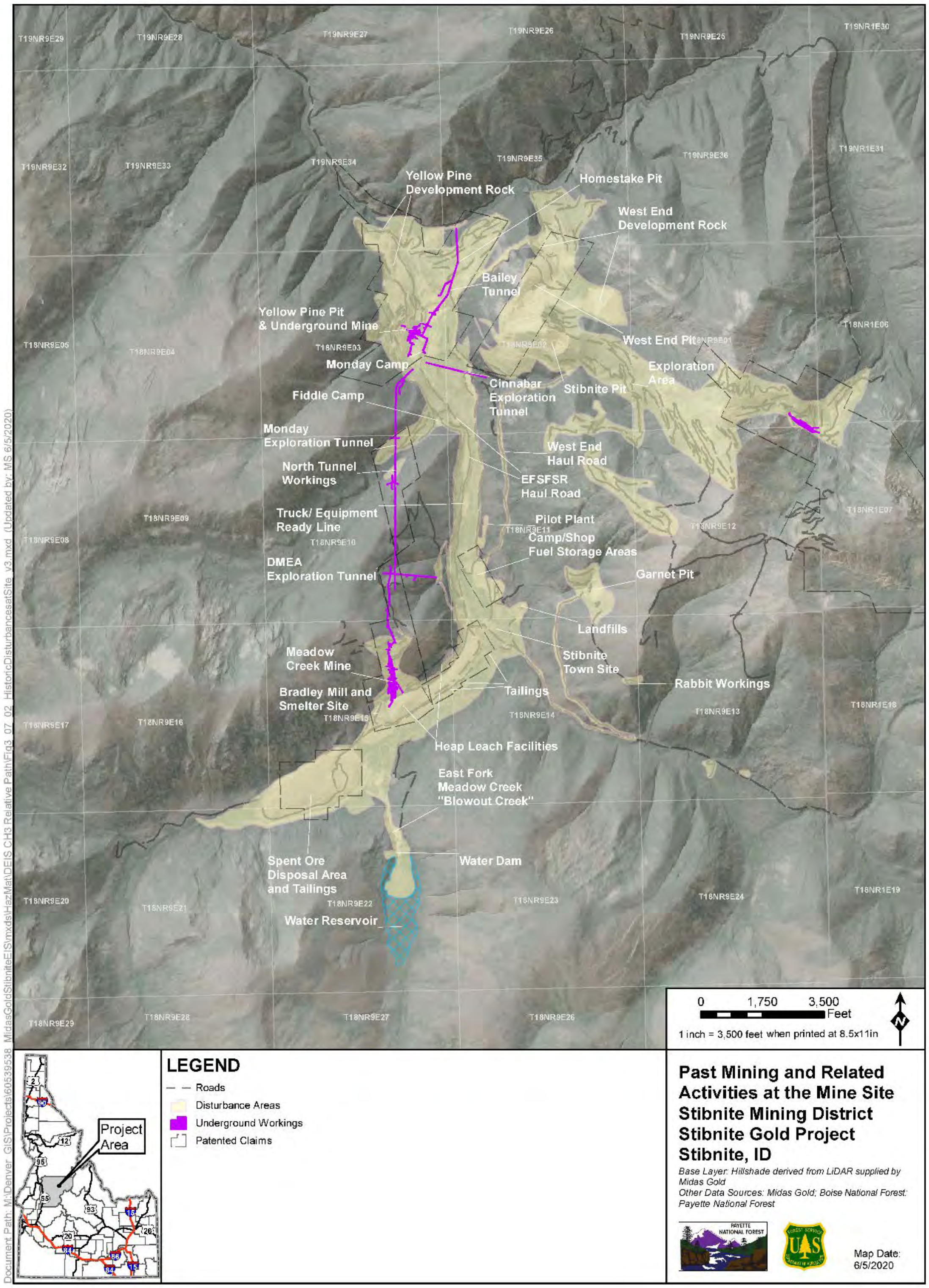

Figure Source: Midas Gold 2016b, Figure 4-2.

Figure 3.7-2 Past Mining and Related Activities at the Mine Site

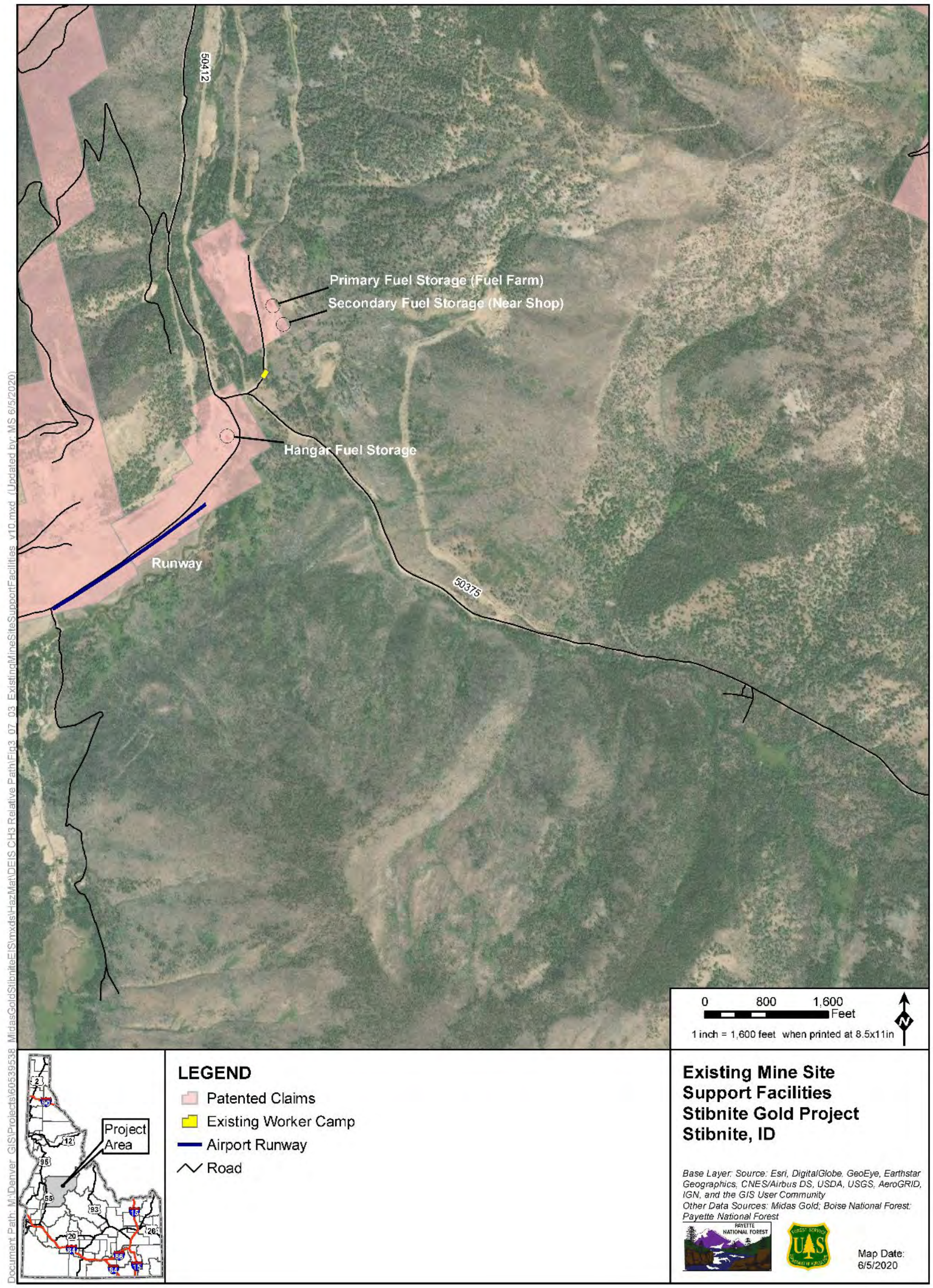

Figure Source: Midas Gold 2016b

Figure 3.7-3 Existing Mine Site Support Facilities

According to the Stibnite Gold Project: Hazardous Materials Baseline Study 2017 baseline study (HDR 2017), the storage tanks are situated within secondary containment and routinely checked for leakage or spillage. If spills occurred, they would be responded to and reported in accordance with the site Spill Prevention, Control, and Countermeasure Plan, as well as state and federal regulations. The most recent reported spill was in February 2012.

The ASTs meet the requirements of the Oil Prevention Pollution regulation (40 CFR 112). Midas Gold annually reports on-site diesel and Jet A fuel storage in accordance with Tier II reporting requirements under the Emergency Planning and Community Right-to-Know Act (40 CFR 370).

Midas Gold has developed a solid waste management plan to assist with the storage, handling, and disposal of solid, special, and hazardous waste streams (HDR 2017). This plan was developed in accordance with state and federal regulations pertinent to waste, although the existing exploration activities are currently considered a Very Small Quantity Generator under RCRA (40 CFR262.14). The solid waste management plan establishes procedures to identify hazardous waste and protocols to track, collect, and dispose of hazardous materials in accordance with state and federal regulations. The plan also outlines methods to minimize the generation of hazardous waste (e.g., using industrial soaps in place of solvents wherever possible).

Table 3.7-1 Petroleum Storage Locations, Types, and Volumes: Table 3.7-1a – Table 3.7-1d

Table 3.7-1a Petroleum Storage Locations, Types, and Volumes – Primary Fuel Storage Area

Location	Contents	No. of Tanks	Quantity per tank (gallon)	Containment
Fuel Farm	Diesel	4	10,000	Double-walled tanks, concrete basin
Fuel Farm	Diesel	2	4,000	Double-walled tanks, concrete basin
Fuel Farm	Diesel	2	500	Single-walled portable tanks, concrete basin (inactive)

Table Source: Midas Gold 2017

Table 3.7-1b Petroleum Storage Locations, Types, and Volumes – Secondary Fuel Storage Area and Hangar Fuel Storage Area

Location	Contents	No. of Tanks	Quantity per tank (gallon)	Containment
Near Shop	Gasoline	2	2,500	Double-walled tank with HDPE-lined tertiary containment
Near Hangar	Jet A	1	5,000	Double-walled tank with HDPE-lined tertiary containment
Near Hangar	Jet A	1	2,500	Double-walled tank with HDPE-lined tertiary containment
Near Hangar	Jet A	3	55	Single-walled tanks, 55-gallon fuel storage drums, HDPE-lined secondary containment

Table Source: Midas Gold 2017

Table Notes:

HDPE = high density polyethylene.

Table 3.7-1c Petroleum Storage Locations, Types, and Volumes – Shop Area

Location	Contents	No. of Tanks	Quantity per Tank (gallon)	Containment
Inside Shop	Used Oil	2	500	Double-walled tank
Shop Generator	Diesel	1	<250	Lined secondary containment
Main Power Generator	Diesel	1	<250	Double-walled tank
Backup Generator	Diesel	1	<250	Lined secondary containment

Table Source: Midas Gold 2017

Table 3.7-1d Petroleum Storage Locations, Types, and Volumes – Miscellaneous Fuel Storage

Location	Contents	No. of Tanks	Quantity per tank (gallon)	Containment
Gestrin Well – Hangar Flats Water Station	Diesel	1	<250	Lined secondary containment
Emergency Tent – Hangar Flats	Heating Oil	1	55 (seasonal)	Lined secondary containment
Emergency Tent – DMEA	Heating Oil	1	55 (seasonal)	Lined secondary containment
Emergency Tent – Yellow Pine	Heating Oil	1	55 (seasonal)	Lined secondary containment
Emergency Tent – Homestake	Heating Oil	1	55 (seasonal)	Lined secondary containment

Table Source: Midas Gold 2017

Table Notes:

DMEA = Defense Minerals Exploration Administration.

3.7.3.2 Access Roads

Current access roads used for the transport of hazardous materials to the mine site include: Warm Lake Road (CR 10-579) from Cascade, continuing to Landmark and then on Johnson Creek Road (CR 10-413) to the village of Yellow Pine and Stibnite Road (CR 50-412) to the mine site.

The largest volume of hazardous materials currently used at the mine site is petroleum hydrocarbons (e.g., diesel, unleaded gasoline, and Jet A fuel). Fuels are transported via tanker truck annually; the transportation of these fluids presents the greatest existing risk for spills and releases to the environment. Exploration-related fuel transportation to the site by Midas Gold has been occurring since 2011 and has consisted of an overall total of 195 fuel trips using 279 fuel tankers, each with a capacity between 4,000 and 4,500 gallons. This work was performed under the fuel transportation Standard Operating Procedure protocol ESOP_004 Fuel Transportation (Midas Gold 2016c). There have been no reported spills or releases associated with the transport of this fuel. (There was a small fuel spill associated with a plane crash in February 2012, described below.)

3.7.3.3 Past Releases, Remediation, and Mitigation

Previous reclamation, remediation, and mitigation activities conducted in the SGP area by other operators are described in detail in the Hazardous Materials Baseline Report completed in 2015, updated in 2017 (HDR 2017). The baseline report also presents a listing of recognized environmental conditions identified during previous environmental assessments conducted in 2010.

The following remediation efforts specifically associated with hazardous waste and other contaminated materials at the mine site have been conducted:

- 2000: Waste oil, waste oil-contaminated debris, sludge, and asphalt sealer stored in ASTs at the site were removed and disposed of in accordance with the applicable laws and regulations governing disposal of hazardous waste (HDR 2017).
- 2002: Removed partial smelter stack and remaining ash in stack for off-site storage. Removed contaminated soil and ash from portion of stack that burned in the 2000 forest fire and placed in a U.S. Forest Service (Forest Service) repository on site, located on top of the NW Bradley Waste Rock Pile. Highly contaminated ash and the wooden stack was disposed off-site at an EPA regulated disposal facility (HDR 2017).
- 2005: Removed contaminated and hazardous materials from the Stibnite Mill building and reportedly disposed off-site (HDR 2017).
- A reportable fuel spill occurred at the site on February 14, 2012. The spill was caused by an airplane crash at the site. The crash released approximately 100 gallons of diesel fuel onto a road adjacent to the airstrip. Snow, ice, and approximately 8 cubic yards of impacted soil were excavated and removed from the site for treatment. No further action was required.

Results of a regulatory database search conducted by the Forest Service Krassel Ranger District in 2015 revealed several operators at various sites within the former mine and processing area were listed as having historical incidents or violations involving ASTs and underground storage tanks, RCRA, and Comprehensive Environmental Response, Compensation, and Liability Act (HDR 2017).

- Pioneer Metals installed one gasoline underground storage tank in 1981 near the Stibnite West End Mine in Yellow Pine. It was closed and removed from the ground in 2002.
- Several historical petroleum releases, the largest of which was a major petroleum leak in 1990 from ASTs providing fuel to power generators adjacent to the Pioneer/Stibnite Mine, Inc. processing facilities. Petroleum-contaminated soil was excavated, and limited groundwater remediation was conducted because diesel fuel was reportedly present on the groundwater's surface. The site of release was never closed and Stibnite Mine, Inc. was never formally released from liability.
- Several RCRA violations based on earlier mining activities, including a confirmed mining metals release in 1979.
- RCRA wastes from the Stibnite Mine, Inc. mill building, assay laboratory, pilot plant, and machine shop were containerized and transported off site for proper disposal during historic site cleanup.
- The Forest Service and the EPA containerized and disposed of ash and residue associated with the Meadow Creek Mill wire-wrapped wood smelter stack after it was destroyed in a fire in 2000.
- The Stibnite mine was placed on the Federal Facilities Docket in 1991 Comprehensive Environmental Response, Compensation and Liability Information System No. 9122307607.
- The Stibnite/Yellow Pine mining area was proposed for listing on National Priorities List in 2001, but no further action has been pursued since then.
- Removal actions for various mine wastes were conducted at the site in November 1998, 2003, August 2004, September 2005, and 2009.

In addition, a recent review of the IDEQ Terradex Facility Mapper, which provides online access to Idaho and EPA regulatory database listings, revealed the following listings associated with former operators of the mine site (IDEQ 2019):

- Hecla Mining Company Yellow Pine is listed on Mine Cyanidation Permit Facilities (CN000012).
- Hecla Mining Company Yellow Pine: General Mine Sites (GM0069); Mine Remediation Action Sites (RA0069); RCRA Hazardous Waste Sites (IDD980665459)
- Midas Gold Mine General Mine Sites (GM0301)

In summary, the Stibnite Mining District was proposed for listing on the National Priorities List in 2001; however, no further action was taken by EPA to designate the Stibnite Mining District as a Superfund Site. Past mining activities have deposited metals, spent and neutralized ore, waste rock, and mine tailings over large portions of the site. Contaminants associated with past mining operations include heavy metals and cyanide in area soil, groundwater, seeps, and sediments. The IDEQ has monitored associated cleanup and site operation and maintenance activities. Additional information on these legacy impacts are covered in Section 3.5, Soils and Reclamation Cover Materials and Section 3.9, Surface Water and Groundwater Quality.

The mining, milling, and processing activities created numerous legacy impacts including underground mine workings, multiple open pits, development rock dumps, mine workings, tailings deposits, heap leach pads, spent heap leach ore piles, a mill and smelter site, three town sites, various camp sites, a ruptured water dam, haul roads, an airstrip, and an abandoned water diversion tunnel (**Figure 3.7-2**). Historic forest fires have created extensive erosion in some areas that have buried former features in debris.

Much of this development took place before environmental regulations on the use, handling, and disposal of hazardous materials were in place. While there is no sampling or investigation data to confirm, it is possible that there are spills of hazardous materials (such as petroleum hydrocarbons) located below existing tailings, sediment, and development rock at the site, as this is not uncommon at historic mining sites.

3.8 Surface Water and Groundwater Quantity

3.8.1 Introduction and Scope of Analysis

This section describes existing conditions related to surface water quantity, groundwater quantity, and water rights. The analysis area (defined further below) encompasses the drainages, watercourses, and groundwater systems where stream flows or the quantity of groundwater storage and transmission may be impacted by the proposed Stibnite Gold Project (SGP), as shown in **Figure 3.8-1**. The following sections describe the scope of analysis completed to characterize the existing conditions, and provide the relevant laws, regulations, and policies that apply to the analysis.

3.8.1.1 Scope of Analysis

3.8.1.1.1 Analysis Area

This section provides characterization of surface water and groundwater existing conditions within an analysis area that encompasses the land where activities associated with the action alternatives could affect stream flows, groundwater levels, groundwater flow directions, groundwater-dependent ecosystems, and water rights. Such actions would be concentrated at the mine site and include groundwater withdrawal, streambed alteration/diversion, and surface water management. Open pit mining projects involve the excavation of pits to remove and access subsurface ore in rock. Open pit mining projects require lowering of the water table via removal of groundwater that would otherwise fill the pit. This is typically achieved by dewatering of sediments and rock formations by pumping from wells installed around the pit. Such pumping can affect surface waters that are to some degree in hydraulic communication with a groundwater system.

The water quantity analysis area encompasses the 12-digit Hydrologic Unit Codes or sub-watersheds that overlap the proposed mine site. The mine site is near the upper end of the East Fork South Fork Salmon River (EFSFSR) within two sub-watersheds: Headwaters EFSFSR and Sugar Creek. The analysis area includes the upper drainage area of the EFSFSR (to downstream of the confluence with Sugar Creek), as well as several tributaries of the EFSFSR. Those include East Fork Meadow Creek (i.e., Blowout Creek), Meadow Creek, Rabbit Creek, Fiddle Creek, Hennessy Creek, Midnight Creek, Garnet Creek, Sugar Creek, and West End Creek, as shown on **Figure 3.8-1** (within the “Mine Site Water Modeling Boundary”). This is the same analysis area for groundwater quality as defined in Section 3.9, Surface Water and Groundwater Quality.

Groundwater within the analysis area moves primarily through unconsolidated alluvium; groundwater flow via deep bedrock is considered minor in comparison (see discussion of hydraulic conductivity of alluvial materials and bedrock formations presented below in Section 3.8.3.2.3, Hydraulic Characteristics of Groundwater-Bearing Materials).

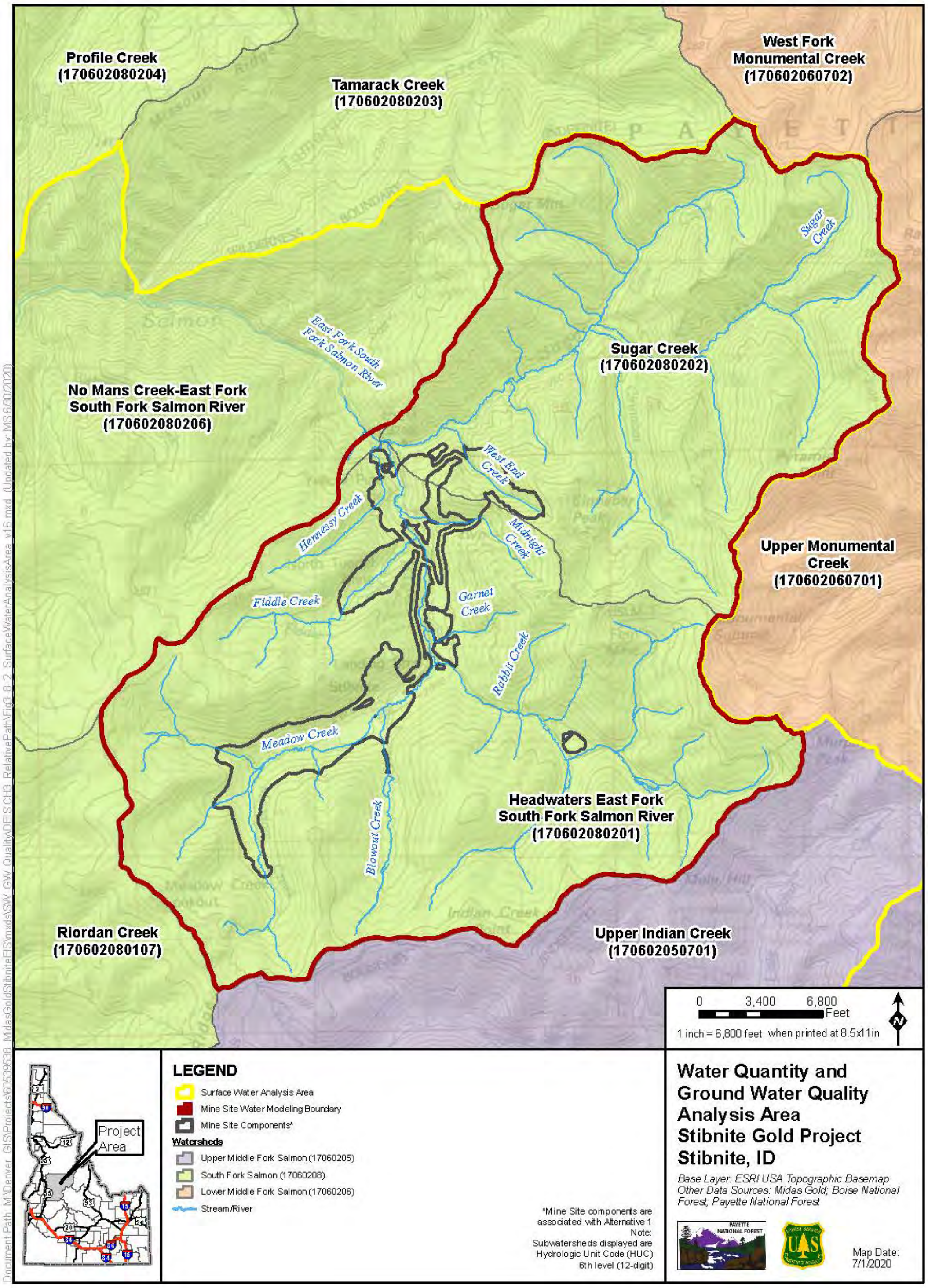

Figure Source: AECOM 2020

Figure 3.8-1 Water Quantity and Groundwater Quality Analysis Area

Because most of the groundwater moves through unconsolidated alluvium, the boundaries of the Sugar Creek and Headwaters EFSFSR sub-watersheds also represent a reasonable approximation of the area subject to analysis of groundwater quantity impacts arising from the SGP. Note that the SGP might still alter streamflow conditions (including access roads, utilities, and off-site facilities) outside the analysis area; however, such alterations are expected to be minor.

The analysis area for water rights is the same as used for surface water and groundwater quantity analysis (**Figure 3.8-1**) and covers the sub-watersheds of Sugar Creek and the Headwaters EFSFSR. The Water Rights discussion identifies instream flow water rights held by Idaho Department of Water Resources (IDWR) and the U.S. Forest Service (Forest Service) that are located downstream from the analysis area on the South Fork of the Salmon River and on the Salmon River.

3.8.1.1.2 METHODOLOGY

This section provides information on existing data sources as well as methodologies applied during past investigations to collect baseline data within the analysis area.

3.8.1.1.2.1 Surface Water

Surface water resource investigations for the SGP were initiated in 2012 to characterize existing conditions in the analysis area. United States Geological Survey (USGS) data from nine gaging stations in or near the analysis area provide much of the available surface water quantity data. Additionally, surface water baseline studies completed from 2012 to 2016 contribute to characterization of the existing surface water hydrology conditions. The baseline study reports describe in detail methodologies used to conduct the studies and collect/compile the relevant data (Brown and Caldwell 2017; HydroGeo 2012b). Baseline sampling has continued beyond 2016; however, characterization of surface waters' baseline conditions draws from the data collected during a period from 2012 to 2016 and presented by Brown and Caldwell 2017. The methods and procedures used included:

- Reviewing background information sources relevant to the analysis area;
- Compiling and analyzing climatological data from regional stations near the analysis area;
- Describing drainage characteristics, completing flow statistics, and peak flow analysis; and
- Developing a summary of seeps and springs identified during the hydrology field survey (HydroGeo 2012b).

Baseline data collection included flow measurements at 32 perennial stream locations and 23 sites where water originated from a seep, adit seep, or another legacy mining-related feature. Investigators selected monitoring locations located at upstream and downstream sites relative to historic and potential future mining activities. For purposes of evaluating the baseline water quantity, monitoring at those locations was carried on for a period of 4 years, from 2012 to 2016. For streams with moderate to high flow, discharge measurements were made using a current meter and the velocity-area (mid-section) method. At sites with very low flow, discharge was measured with graduated buckets using a volumetric method (Brown and Caldwell 2017).

3.8.1.1.2.2 Groundwater

Baseline characterization of groundwater conditions includes description of groundwater levels, hydraulic gradients, groundwater flow directions, hydraulic properties of the rocks and sediments hosting groundwater, groundwater productivity, historical use of groundwater, as well as interactions between surface water and groundwater within the analysis area. Characterization and analyses of baseline groundwater conditions draws from the results of several hydrogeological studies conducted using standard methods, further supported by the results of a surface water and groundwater flow modeling study.

Several parties have investigated groundwater resources in the analysis area for the past 35 years. These investigations evaluated general groundwater hydrology and interaction between groundwater and surface water. A 2017 SPF Water Engineering Groundwater Hydrology Baseline Study report summarizes findings of those previous studies and presents the results of the newer hydrogeological investigations (SPF Water Engineering LLC [SPF] 2017).

Additionally, a Water Resources Summary Report summarizes hydrogeology-related work completed up to 2017 (Brown and Caldwell 2017). The Water Resources Summary Report also provides information regarding IDWR well records for groundwater supply wells constructed in the analysis area.

During 2017, 2018, and 2019, Brown and Caldwell completed surface and groundwater modeling and flow analysis (Brown and Caldwell 2018a,b, 2019a,b,c). Sections 4.9.1.1, Existing Conditions SWWC Model, 4.9.1.2, Proposed Action SWWC Model, and 4.9.1.3, Stream and Pit Lake Network Temperature Model, provide a summary of that modeling work.

The following investigations and studies informed the characterization of existing conditions for groundwater quantity presented in this section:

- Groundwater Hydrology Baseline Study (SPF 2017);
- Water Resources Summary Report (Brown and Caldwell 2017); and
- Hydrologic Model Existing Conditions (Brown and Caldwell 2018a).

3.8.2 Relevant Laws, Regulations, Policies, and Plans

3.8.2.1 Federal Regulations

The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged, and/or fill material within waters of the United States pursuant to Section 404 of the Clean Water Act. Although the USACE does not specifically regulate water rights in Idaho, SGP activities that could alter surface water quantity may be regulated and require a USACE authorization.

There also are several federal regulations related to water-resource use (including for water acquired through a water right). However, these federal regulations do not have a direct application to the water rights process in Idaho. The exception is the Wild and Scenic Rivers Act of 1968. In 2004, the Main Salmon, Middle Fork Salmon, Rapid, Selway, Lochsa, and Middle Fork Clearwater rivers were designated as Wild and Scenic Rivers under the Wild and Scenic Rivers Act (16 United States Code 1271-1287), which reserves instream water rights for designated rivers, and requires additional detailed administration of existing and new water rights. The relevant instream flow rights and “detailed administration” are primarily established and delineated in the Snake River Basin Adjudication. Settlement stipulation is referenced and discussed in Section 3.8.3.3 Water Rights.

3.8.2.2 State Regulations

The IDWR regulates mine tailings impoundments with dams higher than 30 feet and prescribes that regulations may have to be considered when a tailings impoundment affects surface water hydrology.

The IDWR also is responsible for administration of water rights, well construction standards, dam safety, and stream channel alteration. Any water right to implement the SGP would need to be granted to the applicant by the State of Idaho through IDWR. The constitution and statutes of the State of Idaho declare all waters of the state to be public but provide the right to divert public waters to put them to beneficial use, which includes mining activities (IDWR 2019). This right is defined in the Idaho State constitution as follows: “the right to divert and appropriate the unappropriated waters of any natural stream to beneficial uses shall never be denied, except that the state may regulate and limit the use thereof for power purposes” (Idaho State Constitution Article 15, Section 3).

The State of Idaho adheres to the prior appropriation doctrine, according to which the first person or entity to appropriate water for beneficial use has the right to continue to use that water for that purpose and is the first to receive the water in times of shortage. A water right is obtained through an application and permitting process, which must ensure enough water is available for the water right and that the oldest (senior) water rights are satisfied first (IDWR 2019). Appropriative rights must be used to be retained; surface water and groundwater rights are forfeited by a failure, for the term of 5 years, to apply it to the beneficial use for which it was appropriated (Idaho Code 42-222 and 42-237). Mining specifically has a provision in place under Idaho Code 42-223(11) to protect water rights associated with mining projects from forfeiture.

3.8.2.3 Valley County Regulations

Valley County reviews development proposals for consistency with the County’s Land Use Development Ordinance. When permits are required by other agencies for all or parts of the application, evidence of the permit and compliance with the provisions of the permit are to be a condition of the land use approval. This includes permits to alter wetlands; permits to construct in flood prone areas; and in other situations where the review and issuance of the permit would ensure that the proposal would be technically feasible.

3.8.2.4 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for surface water and groundwater quantity and include various objectives, guidelines, and standards for this purpose."

3.8.3 Existing Conditions

The SGP is located in mountainous terrain with narrow valleys and steep slopes. Elevations range from 6,000 to 6,600 feet above mean sea level along valley floors and rise to elevations exceeding 8,500 feet above mean sea level in the surrounding mountains (HydroGeo 2012a). Hydrologic conditions are dominated by seasonal patterns of snow accumulation and snowmelt. Throughout the winter, snow accumulates and then melts as temperatures rise in spring and early summer. The majority of snowmelt contributes to surface runoff, and to a lesser extent infiltrates into the subsurface, or is taken up by vegetation.

The following sections provide a summary description of the existing physical conditions of surface water and groundwater resources in the analysis area, and a discussion of existing water rights.

3.8.3.1 Surface Water

3.8.3.1.1 MINE SITE

The mine site is in the Headwaters EFSFSR and Sugar Creek sub-watersheds. The primary surface water features at the mine site include the EFSFSR and its tributaries (**Figure 3.8-1**), as well as intermittent drainages, ephemeral drainages, seeps, springs, wetlands, and ponds.

These features include 10 named surface water channels: the EFSFSR, Rabbit Creek, Meadow Creek, East Fork Meadow Creek (also known as Blowout Creek), Garnet Creek, Fiddle Creek, Midnight Creek, Hennessy Creek, West End Creek, and Sugar Creek. Most of these streams occur in the Headwaters EFSFSR subwatershed except for Sugar Creek and West End Creek, which are in the Sugar Creek subwatershed. Brief descriptions of each stream are provided below, and specific drainage and channel characteristics are summarized in **Table 3.8-1**.

Table 3.8-1 Summary of Stream Characteristics in the Proposed Mine Site Area

Drainage	Approximate Drainage Area (square miles)	Channel Length (miles)	Elevation Change (feet)	Average Gradient (%)
EFSFSR (upstream of Sugar Creek)	25.0	7.04	2,129	5.7
Meadow Creek	7.7	4.78	1,570	6.2
East Fork Meadow Creek	2.4	2.66	1,491	10.6
Rabbit Creek	0.6	1.19	1,506	24.0
Garnet Creek	0.5	1.24	1,558	23.8
Fiddle Creek	2.0	2.47	1,444	11.1
Midnight Creek	0.9	1.83	2,205	22.8
Hennessy Creek	0.7	1.16	1,499	24.5
West End Creek	0.6	1.55	2,234	27.3
Sugar Creek	17.4	7.14	2,356	6.2

Table Source: Brown and Caldwell 2017; HydroGeo, Inc. 2012b

The EFSFSR is a perennial stream that flows from southeast to northwest through the mine site and has a drainage basin of 25 square miles upstream of Sugar Creek. It is the principal stream draining the mine site and receives flow either directly or indirectly from all other drainages listed in **Table 3.8-1**. At ordinary high water, the EFSFSR is approximately 2 to 3 feet deep and 25 to 30 feet wide (Brown and Caldwell 2017).

Historical mining activities have affected the course of the EFSFSR in the central portion of the mine site where it flows through a lake that has formed in the Yellow Pine pit. The river enters the pit on the south side and exits from the north. The flow velocity of the EFSFSR slows as it passes through the abandoned pit, causing the river to drop much of its sediment load which is then deposited across the lake bottom. The original Yellow Pine pit was excavated to a depth of 125 feet below the current pit lake level, but sediment deposited through time has reduced the lake depth to only 35 feet. The lake has a surface area of approximately 4.75 acres and is estimated to contain approximately 92 acre-feet of water (Brown and Caldwell 2017). An artificial drop into the pit creates a steep whitewater cascade on the EFSFSR and blocks upstream fish passage south of the pit lake.

Meadow Creek originates at the southwestern end of the mine site, flows east into the EFSFSR, and drains an area of approximately 7.7 square miles. The Meadow Creek headwaters occur in an alpine lake, and the drainage contains multiple wetland complexes covering an estimated 175.26 acres. At ordinary high-water, Meadow Creek is approximately 2 to 4 feet deep and 20 to 25 feet wide at the bottom of the drainage (Brown and Caldwell 2017). The Meadow Creek valley has been heavily impacted by historical mining activity, including: deposition of tailings across much of the valley floor (some of which is covered by spent heap leach ore); development and operation of an underground mine; construction and operation of a mill and smelter; construction and operation of an airstrip; construction and use of small scale dams to retain water and/or tailings; construction and use of various buildings; construction of heap leach facilities; and repeated straightening and diversion of Meadow Creek in rock-lined channels. Some of these impacts have been partially mitigated by diverting water around the upper tailings/spent ore disposal area in a rip rap lined ditch for approximately 4,400 feet and by constructing a sinuous stream channel in the lower Meadow Creek valley.

East Fork Meadow Creek is a tributary to Meadow Creek that drains an area of 2.4 square miles in the southern end of the mine site (**Figure 3.8-1**). The creek previously supplied water to a large man-made reservoir that provided hydroelectric power and process water to the mine site's historical mill and smelter. East Fork Meadow Creek is locally referred to as Blowout Creek because the dam forming the reservoir breached in 1965, causing large-scale scouring of the steep channel downstream, and deposition of a large alluvial fan. From its headwaters, East Fork Meadow Creek meanders through a former wetland area that dried up due to stream incision and declining groundwater levels related to the dam failure.

Rabbit Creek and Garnet Creek are small tributaries of the EFSFSR that drain 0.6 and 0.5 square mile, respectively. Rabbit Creek is in a steep drainage that has very steep side slopes, with numerous seeps and springs occurring throughout its headwaters. Garnet Creek is formed from seeps and springs located in the eastern portion of the mine site. The current shop, camp facilities, and the historical Garnet Pit are in the Garnet Creek drainage. Historic waterworks from the 1940s and 1950s as well as a 1990s diversion are present below the former open pit.

Fiddle Creek occurs in a well-defined glacial cirque, drains an area of 2 square miles, and flows into the EFSFSR from the west. The drainage area for Fiddle Creek includes forested and open scree slopes. The middle reach of Fiddle Creek also contains a former reservoir and dam, and a former townsite above and below the County Road occurs in the lower reach. In addition, the creek itself was diverted from its natural outfall site to the north under the County Road through a culvert in the 1980s.

Midnight Creek is a small tributary that drains an area of 0.9 square mile and flows into the EFSFSR from the east, just above the Yellow Pine pit lake. Several miles of current and historical exploration and haul roads exist in the Midnight Creek drainage.

Hennessy Creek is a small tributary that drains an area of 0.7 square mile and flows into the EFSFSR from the west. The upper end of the drainage is heavily forested, and the lower portion of the drainage has been modified by current access roads and historical mine workings. Hennessy Creek also has a historic water diversion just above the county road that included a large pipe system. The creek flows in the direction of and then adjacent to Stibnite Road (County Road 50-412), in a channel around a Forest Service-constructed waste repository, disappears and then reemerges among historical development rock piles, and flows through a culvert before entering the EFSFSR.

West End Creek flows into Sugar Creek from the south and has a drainage area of 0.6 square mile. The drainage basin of West End Creek was modified extensively and diverted into a now failed french drain system during construction of the large waste rock dump in the middle reach. The current creek flow disappears and reemerges among historical waste rock piles. Several miles of current and historical exploration roads are present in the West End Creek drainage.

Finally, Sugar Creek is a relatively large tributary that drains an area of approximately 17.4 square miles and flows into the EFSFSR from the east. A portion of the upper Sugar Creek valley has been impacted by past mercury mining activities at the former Cinnabar Mine. These activities included underground mine development and operations, development rock disposal, ore processing, deposition of tailings in the valley, construction and use of buildings and housing (several of which still exist), and road construction.

The remainder of this section summarizes streamflow data from USGS gaging stations and stream flow/seep data for the EFSFSR and selected tributaries.

3.8.3.1.1.1 USGS Gaging Station Data

Nine USGS streamflow gages (**Figure 3.8-2**) in and near the analysis area provide data to characterize the existing environment. **Table 3.8-2** provides streamflow statistics for the nine USGS gaging stations, and **Figure 3.8-3** presents average monthly discharge hydrographs for six active USGS gaging stations present in the analysis area. The hydrographs illustrate the snowmelt-dominated streamflow pattern observed in the area with flows beginning to rise in March and April and peaking in May or June, before receding to base flow conditions in late summer/fall and remaining low through the winter.

Table 3.8-2 USGS Gaging Station Drainage Area and Flow Statistics

Gage Number	Gage Name	Drainage Area (square miles)	Min (cfs)	Max (cfs)	Mean (cfs)	Median (cfs)	Period of Record (# years monitored)
1331850	Meadow Creek near Stibnite, Idaho	5.6	1.37	118	10.27	3.95	09/2011–2016 (5 years)
13310800	EFSFSR above Meadow Creek near Stibnite, Idaho	9.0	2.91	110	11.52	5.75	09/2011–2016 (5 years)
13311000	EFSFSR at Stibnite, Idaho	19.3	3.50	413	31.50	13.00	1928–1943 1982–1997 2010–2016 (36 years)
13311450	Sugar Creek near Stibnite, Idaho	18.0	4.78	251	25.58	11.60	09/2011–2016 (5 years)
13311250	EFSFSR above Sugar Creek near Stibnite, Idaho	25.0	4.39	361	37.96	16.00	09/2011–2016 (5 years)
13311500	[1]EFSFSR near Stibnite, Idaho	43.0	10.00	783	50.39	20.00	06/1928–09/1941 (13 years)
13312000	[1]EFSFSR near Yellow Pine, Idaho	107.0	28.00	1,660	142.40	59.00	08/1928–07/1943 (13 years)
13313000	Johnson Creek at Yellow Pine, Idaho	218.0	28.00	5,440	342.51	106.00	09/1928–2016 (88 years)
13310700	South Fork Salmon River near Krassel Ranger Station, Idaho	330.0	58.00	6,200	534.50	210.00	10/1966–2016 (50 years)

Table Source: Brown and Caldwell 2017 – Table 7-9

Table Notes:

1 Inactive

cfs = cubic feet per second.

EFSFSR = East Fork South Fork Salmon River

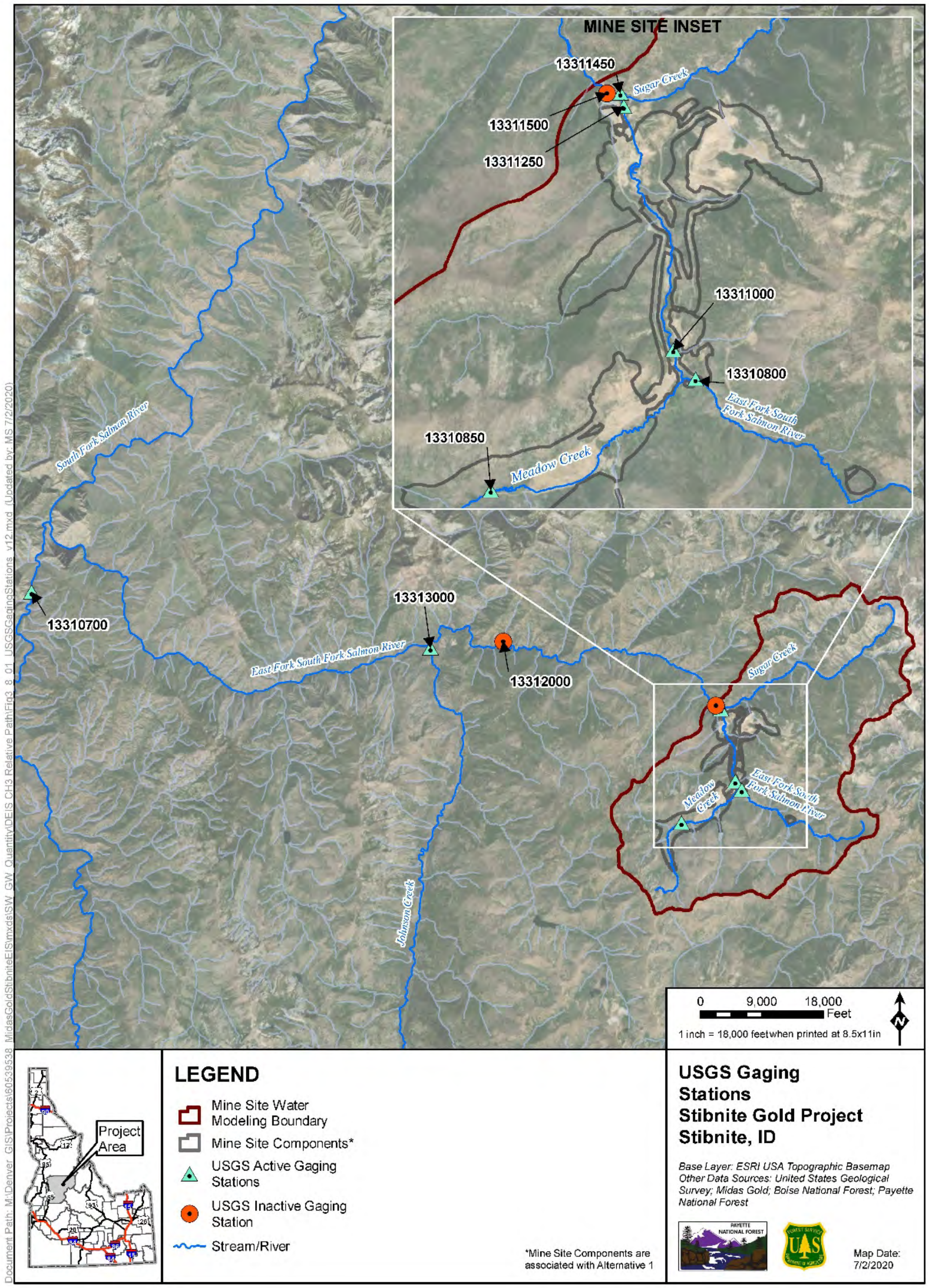

Figure Source: Brown and Caldwell 2017 – Figure 7-8.

Figure 3.8-2 USGS Gaging Stations

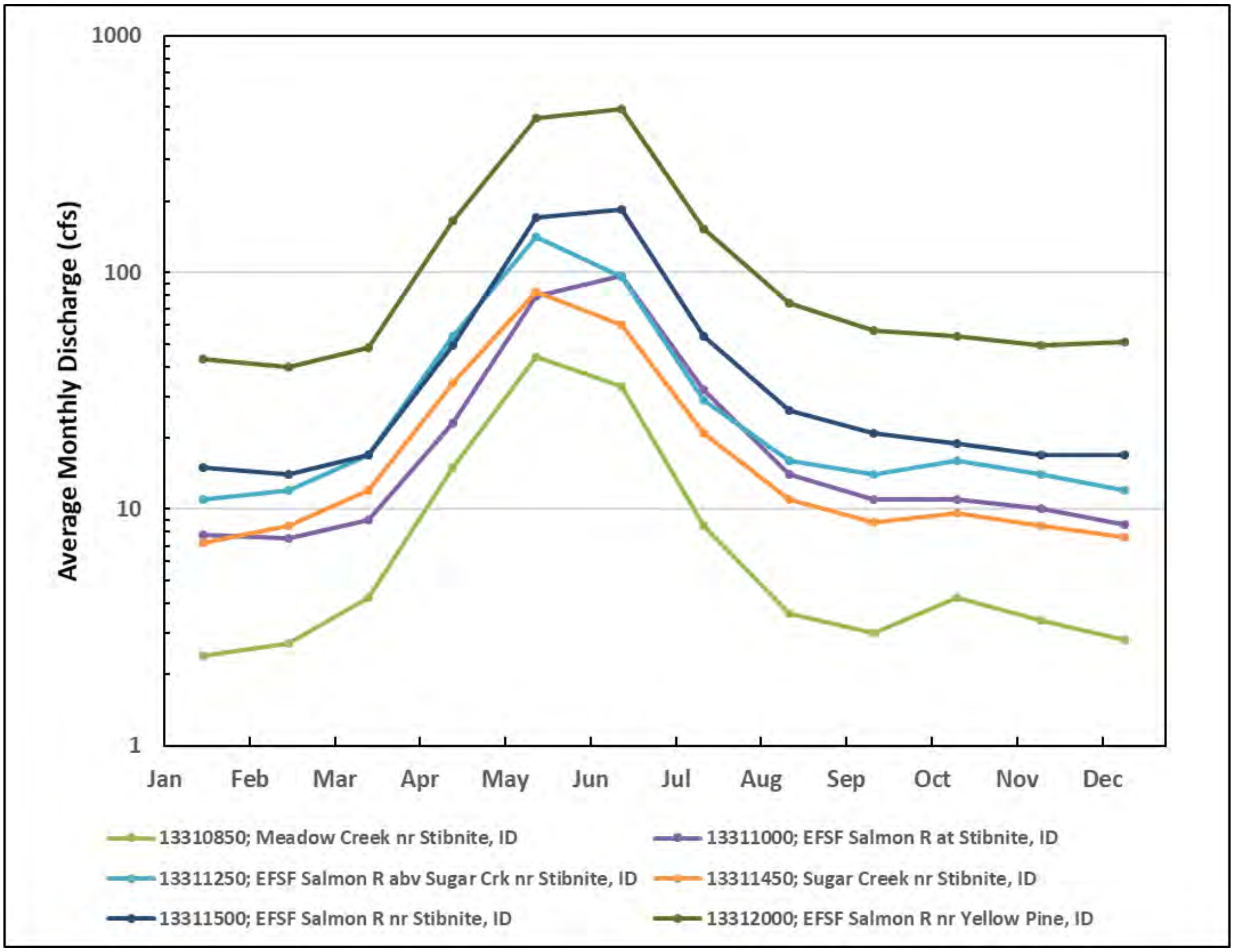

Figure Source: Brown and Caldwell 2017 – Figure 7-11

Figure 3.8-3 Average Monthly Discharge at USGS Gaging Stations in the SGP Area

Baseflow and groundwater recharge estimates were derived using data from two of the USGS gaging stations in the analysis area (Brown and Caldwell 2017). Those two stations, USGS 13311250 (located at the EFSFSR above Sugar Creek) and USGS 13311450 (located at Sugar Creek before its discharge to the EFSFSR), together provide measurements that can be used to estimate groundwater recharge over the entire analysis area by calculating combined baseflow leaving the analysis area. These estimates assume that groundwater flow across the analysis area boundaries and groundwater losses via evapotranspiration are negligible. The estimates also assume that during the periods of low flow (late summer, fall, and winter), the entire flow of each stream is derived from groundwater discharge into the stream. Stream discharges measured at the USGS gages during August, September, and October are interpreted to represent baseflow conditions (Brown and Caldwell 2017). This interpretation is based on 1) analysis of hydrographs, 2) lack of significant precipitation during these months, and 3) minor flow variations during this period of year.

Average discharges measured during October 1-7, 2012, and August 13-19, 2015 (Brown and Caldwell 2017) at the two key stations were:

- 7.64 cfs and 9.02 cfs, respectively, for station 13311450 (Sugar Creek) – with an average of 8.33 cfs; and
- 12.00 cfs and 12.77 cfs, respectively, for station 13311250 (EFSFSR) – with an average of 12.39 cfs.

Considering approximate drainage areas for each of those two stations (18 square miles for Sugar Creek and 25 square miles for the EFSFSR [Brown and Caldwell 2017]), groundwater recharge over the Sugar Creek and EFSFSR drainage areas was calculated to be 6.5 and 6.7 inches per year, respectively. These values represent about 20 percent of the estimated annual precipitation for the SGP area, which is equal to 32.19 inches (Brown and Caldwell 2017).

Groundwater recharge assigned as input to the surface water and groundwater model was derived from meteoric water balance, as presented by Brown and Caldwell (2018a), not directly from these baseflow estimates.

USGS data also were used to derive peak flow statistics for the ten major drainages in the analysis area. Results from the peak flow analysis were summarized in the baseline study (HydroGeo 2012b) and are presented in the following section.

3.8.3.1.1.2 Baseline Monitoring Streamflow and Seep Data

Streamflow data were collected in conjunction with surface water quality sampling on a monthly or quarterly basis at 32 non-USGS monitoring stations (**Figure 3.8-4**). The monitoring points were selected at upstream and downstream locations to bracket historical and potential future mining activities in the analysis area (Brown and Caldwell 2017). **Table 3.8-3** provides streamflow statistics derived from baseline measurements collected between 2012 and early 2016. The average flows calculated from this dataset for the EFSFSR ranged from 4.47 cfs at the farthest upstream monitoring location YP-SR-14, to 31.31 cfs at the most downstream location YP-SR-2. Note that the baseline monitoring sites are at different locations than the USGS gaging stations, thus providing additional site-specific data.

The HydroGeo hydrology field survey completed in 2012 identified 347 hydrologic seep/spring sites within the study area (HydroGeo 2012a). The majority of seeps and springs were found in the glacial cirques that form the headwaters of Meadow Creek, Fiddle Creek, and Hennessy Creek (**Figure 3.8-8**). Monitoring of seep discharge was established at 23 sites (**Figure 3.8-4**) during the baseline studies to assess stream contributions and for conceptualization of surficial flow in the analysis area. Average discharge measured at the sites ranged from 0.0023 cfs at YP-AS-7 in the Meadow Creek drainage to 0.25 cfs at YP-SEBS-2 in the EFSFSR drainage. **Table 3.8-4** provides statistics for the seep discharge.

Table 3.8-3 Baseline Monitoring Surface Water Flow Statistics

Monitoring Site	Stream	Min (cfs)	Max (cfs)	Median (cfs)	Mean (cfs)
YP-SR-2	EFSFSR	8.97	74.56	26.49	31.31
YP-SR-4	EFSFSR	7.67	37.84	13.69	16.92
YP-SR-6	EFSFSR	8	50.76	14.39	20.38
YP-SR-8	EFSFSR	5.88	61.08	13.46	19.33
YP-SR-10	EFSFSR	6.23	106.21	12.76	23.97
YP-SR-11	EFSFSR	3.32	40.67	5.37	10.41
YP-SR-13	EFSFSR	2.05	54.92	4.64	11.56
YP-SR-14	EFSFSR	0.48	22.25	1.12	4.47
YP-T-1	Sugar Creek	5.71	78.06	11.59	21.24
YP-T-6	West End Creek	0.16	1.68	0.39	0.51
YP-T-7	Sugar Creek	5.25	34.12	9.89	12.51
YP-T-8A	Sugar Creek	4.61	77.36	8.32	19.27
YP-T-10	Midnight Creek	0.15	2.62	0.34	0.67
YP-T-11	Fiddle Creek	0.22	20.57	0.8	3.3
YP-T-12	Fiddle Creek	0.15	17.87	0.88	3.59
YP-T-15	Scout Creek	0.04	0.62	0.1	0.15
YP-T-21	Rabbit Creek	0.22	3.47	0.63	0.95
YP-T-22	Meadow Creek	3.91	86.61	7.23	17.94
YP-T-27	Meadow Creek	2.78	76.45	5.6	14.86
YP-T-29	East Fork Meadow Creek	0.78	24.45	1.81	4.69
YP-T-33	Meadow Creek	1.96	41.13	3.8	9.22
YP-T-35	Garnet Creek	0.01	1.16	0.07	0.19
YP-T-37	West End Creek	0.003	0.12	0.01	0.03
YP-T-40	Salt Creek	0.8	13.38	1.58	2.8
YP-T-41	Hennessy Creek	0.15	7.37	0.33	1.25
YP-T-42	Midnight Creek	0.12	3.59	0.5	0.99
YP-T-43	Meadow Creek	1.97	49	4.89	13.48
YP-T-44	Fern Creek	0.06	2.65	0.22	0.54
YP-T-45	North Fork Meadow Creek	0.24	19.01	1.11	3.92
YP-T-46	South Fork Meadow Creek	0.28	9.67	1.02	3.04
YP-T-48	Hennessy Creek	0.09	5.09	0.38	1
YP-T-49	West End Creek	0.37	1.37	0.39	0.71

Table Source: Brown and Caldwell 2017

Table Notes:

cfs = cubic feet per second.

EFSFSR = East Fork South Fork Salmon River.

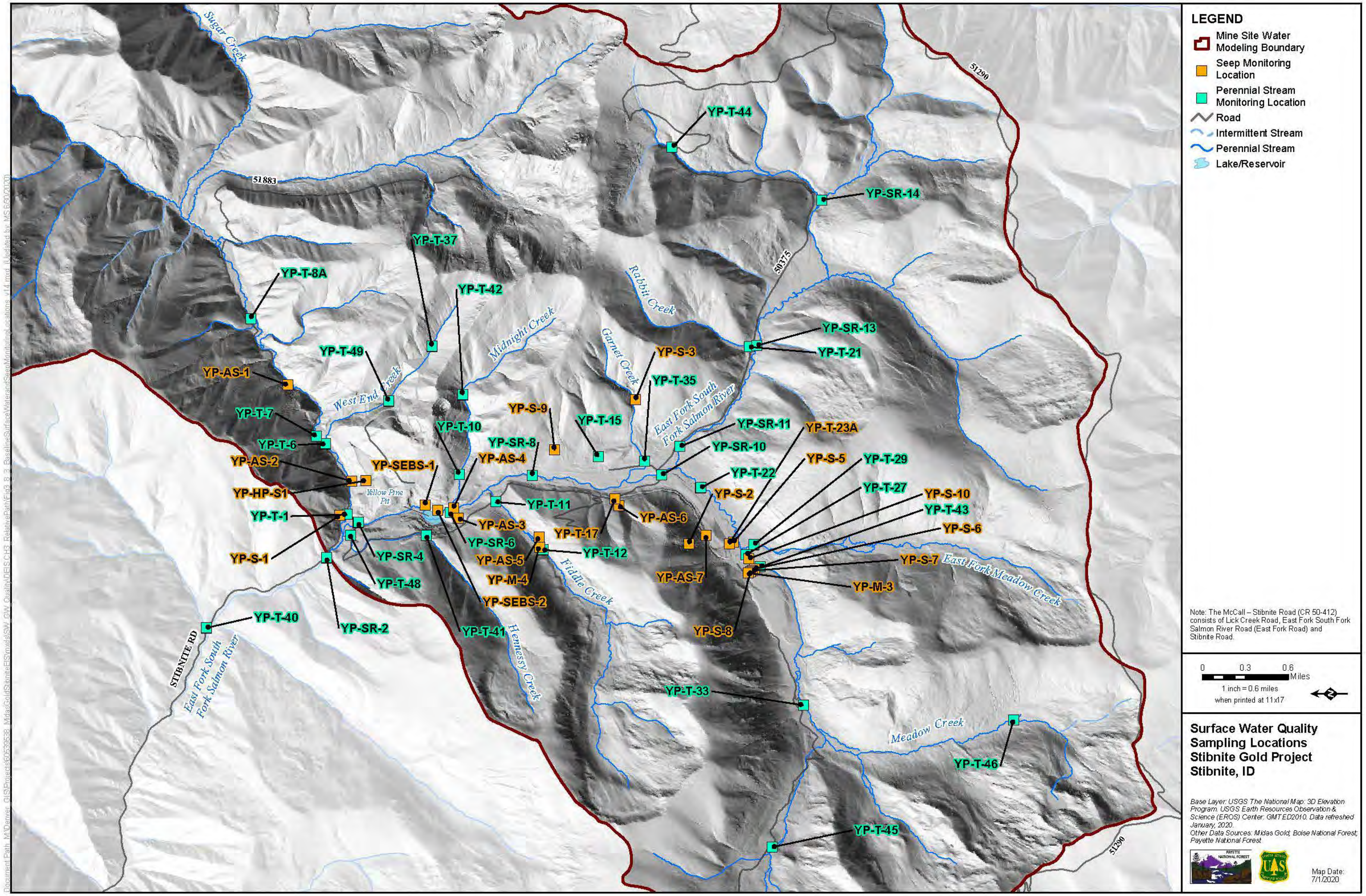

Figure Source: AECOM 2020

Figure 3.8-4 Surface Water Sampling Locations

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Table 3.8-4 Baseline Monitoring Seep Discharge Statistics

Monitoring Site	Drainage	Min (cfs)	Max (cfs)	Median (cfs)	Mean (cfs)
YP-AS-1	Sugar Creek	0.0003	0.09	0.002	0.01
YP-AS-2	Sugar Creek	0.03	0.22	0.06	0.08
YP-AS-3	EFSFSR	0.0005	0.03	0.002	0.005
YP-AS-4	EFSFSR	0.015	0.3	0.07	0.1
YP-AS-5	Fiddle Creek	NM	NM	NM	NM
YP-AS-6	EFSFSR	0.0004	0.01	0.003	0.0043
YP-AS-7	Meadow Creek	0.000012	0.0052	0.002	0.0023
YP-HP-S1	Sugar Creek	0.0052	0.29	0.05	0.085
YP-M-3	Meadow Creek	0.006	0.75	0.08	0.135
YP-M-4	Fiddle Creek	NM	NM	NM	NM
YP-S-1	Sugar Creek	0.00003	0.03	0.001	0.004
YP-S-2	Meadow Creek	0.000003	0.02	0.0003	0.004
YP-S-3	EFSFSR	0.005	0.23	0.04	0.05
YP-S-5	Meadow Creek	0.002	0.04	0.01	0.02
YP-S-6	Meadow Creek	0.0003	0.006	0.0036	0.0036
YP-S-7	Meadow Creek	0.007	0.01	0.01	0.01
YP-S-8	Meadow Creek	0.0003	0.05	0.005	0.008
YP-S-9	EFSFSR	0.0007	0.004	0.001	0.002
YP-S-10	Meadow Creek	0.03	0.86	0.13	0.21
YP-SEBS-1	EFSFSR	0.006	0.07	0.037	0.036
YP-SEBS-2	EFSFSR	0.024	0.54	0.21	0.25
YP-T-17	EFSFSR	0.0004	0.12	0.01	0.02
YP-T-23A	Meadow Creek	0.0003	0.05	0.01	0.02

Table Source: Brown and Caldwell 2017

Table Notes:

cfs = cubic feet per second.

NM = Not Measured.

EFSFSR = East Fork South Fork Salmon River.

A peak flow analysis also was completed for the ten major drainages in the analysis area. Peak flows were calculated for the bottom of each drainage using the USGS StreamStats program. Predicted peak flows for a 1.5-year event ranged from 1.84 cfs for West End Creek to 237 cfs for the EFSFSR, and for a 500-year event they ranged from 13.4 cfs to 931 cfs, respectively. **Table 3.8-5** provides the maximum instantaneous flow predicted to occur for various return periods from a 1.5-year event up to a 500-year event.

Table 3.8-5 Peak Steam Flow Statistics for Drainages in the Analysis Area

Drainage	1.5-year event	2-year event	2.33-year event	5-year event	10-year event	25-year event	50-year event	100-year event	200-year event	500-year event
	PK1_5 (cfs)	PK2 (cfs)	PK2_33 (cfs)	PK5 (cfs)	PK10 (cfs)	PK25 (cfs)	PK50 (cfs)	PK100 (cfs)	PK200 (cfs)	PK500 (cfs)
EFSFSR	237	290	304	410	495	598	671	763	834	931
Meadow Creek	57.2	70.2	73.6	99.2	120	145	163	186	204	229
East Fork Meadow Creek	22.4	27.8	29.2	39.8	48.5	59.2	67	76.8	84.6	95.1
Rabbit Creek	28.2	33.3	34.4	43.4	50.4	58.4	63.9	71.1	76.3	83.1
Garnet Creek	4.66	5.94	6.32	8.94	11.1	13.9	16	18.5	20.6	23.5
Fiddle Creek	6.78	8.89	9.59	14.2	18.3	23.6	27.6	32.5	36.7	42.5
Midnight Creek	3.05	4.04	4.37	6.56	8.48	11	13	15.4	17.5	20.3
Hennessy Creek	2.22	2.98	3.25	4.98	6.52	8.59	10.2	12.1	13.8	16.2
West End Creek	1.84	2.46	2.67	4.08	5.35	7.04	8.36	9.97	11.4	13.4
Sugar Creek	76.8	96.6	103	144	178	220	251	289	320	362

Table Source: HydroGeo 2012b

Table Notes:

cfs = cubic feet per second.

EFSFSR = East Fork South Fork Salmon River.

3.8.3.2 Groundwater

3.8.3.2.1 General Description

The bedrock geology in the groundwater quality analysis area consists primarily of Cretaceous-age intrusive rocks of the Idaho Batholith and pre-Cretaceous metasedimentary rocks (Section 3.2.3.1, Geologic Resources and Geotechnical Hazards, Existing Conditions, Geologic Setting). The most common Cretaceous intrusive rock in the mine site area is granodiorite. (In this EIS, the term granodiorite is used synonymously with quartz monzonite to describe the primary rock type of the Idaho Batholith. Intrusive rock nomenclature correlations are described in Gillerman et al. [2019]). Older metasedimentary rocks (including quartzite, marble, dolomite, calc-silicate, and quartzite-schist) found in the eastern portion of the analysis area are associated with a roof pendant, an older rock body embedded into intrusive magma during emplacement of the Idaho Batholith (**Figure 3.2-2**) (Midas Gold 2016). The bedrock in the analysis area is faulted and fractured, with the major faults striking primarily to the north and northeast.

Glaciers occupied the Meadow Creek valley and the adjoining valley of the EFSFSR during the Pleistocene. Glacial moraines occur in the larger valleys, and lateral moraines are present along the sides of Meadow Creek and the EFSFSR. Secondary outwash deposits of sediments created by glacial forces subsequently filled the EFSFSR valley, Meadow Creek valley, and other tributaries with over 300 feet of glacial-fluvial-colluvial deposits consisting of silt, sand, and gravel in some places. Recent alluvial deposits (including terrace gravels and alluvial fans), which contain reworked glacial deposits, are present in the stream beds and as narrow ribbons in the middle of the valleys. Other recent deposits include colluvial and landslide materials. The valley bottoms locally contain legacy mining-related materials and fill, such as mine dumps, tailings piles, and spent ore piles (Midas Gold 2016).

Groundwater flow in the analysis area occurs primarily in the Quaternary unconsolidated deposits filling the valleys (composed of alluvium, glacial, and glaciofluvial materials), and through the unconsolidated deposits covering the mountainsides (e.g., glacial moraines, talus, colluvial, and landslide materials). The unconsolidated Quaternary deposits in the valleys form what is defined as an alluvial aquifer. Some groundwater flow also occurs along fractures in shallow bedrock and fracture zones and faults within deeper bedrock (SPF 2017), and via historical mine workings, such as adits, that penetrate the bedrock units. Note: fractures and faults are not explicitly represented in the hydrologic model. Section 4.8.1.1.1 presents a discussion of implications of lack of such explicit representation.

The unconsolidated deposits receive water from snowmelt, precipitation, and infiltration of surface runoff from upland areas, and groundwater discharge from the underlying fractured bedrock. Groundwater discharges primarily to streams, but also feeds wetlands, seeps, and springs. The water discharging from unconsolidated deposits to the surface via seeps and springs often flows only a short distance over the surface before infiltrating back into the unconsolidated materials (SPF 2017).

3.8.3.2.2 GROUNDWATER LEVELS, GRADIENTS, AND FLOW DIRECTIONS

Baseline characterization of groundwater levels, gradients, and flow directions is founded on: 1) spot measurements conducted using 31 monitoring wells, with a minimum of six water level measurements per well; 2) continuous measurements in three monitoring wells (SRK-GM-11S/21S/24S – location of those wells is marked on Figure 8-1 of Brown and Caldwell 2017 report); and 3) continuous pore-water pressure measurements in four boreholes (vibrating wire piezometers installed in boreholes MGI-12-271, MGI-12-250, MGI-11-131, and MGI-11-123 – more information about those instruments is provided in Table 8-2 of Brown and Caldwell 2017 report and in "Vibrating Wire Piezometer Data section of SPF 2017 report). Of those 31 wells, 19 are completed in alluvium, and 12 in bedrock. Groundwater level data used for baseline characterization was collected from December 2011 through June 2016 (SPF 2017). Alluvium wells are completed with screen bottoms at depths ranging from 31 to 310 feet below ground surface (bgs), and bedrock wells have screen bottoms at depths ranging from 60 to 478 feet bgs (Brown and Caldwell 2017). Collection of groundwater level data is ongoing.

Most wells and boreholes (completed in both alluvium and bedrock) exhibit seasonal groundwater level fluctuations typically ranging from approximately 2 to 20 feet. The highest water levels occur at the peak of the spring runoff period (i.e., between May and July), with levels receding to a minimum by late summer or early fall. The spot measurements in these wells indicate both the seasonality and the amplitude of annual fluctuations. Continuous water level measurements also show responses to major recharge events.

Figure 3.8-5 shows water table elevation contours for the analysis area computed by the groundwater model calibrated to water levels measured in December 2015 (Brown and Caldwell 2018a). The calculated scaled (root-mean-square) error (percent), which is considered among the most reliable measures of model calibration to groundwater levels (Anderson and Woessner 1992), is reported to be 1.5 percent (Brown and Caldwell 2018a). This result is better than reported for most calibrated groundwater models and indicates that the calibration errors are only a small part of the overall model response (Anderson and Woessner 1992). The water table contours mimic the land surface topography. The contours shown indicate that the water table is present both within unconsolidated sediments (particularly in the valley alluvium), and within shallow bedrock (mainly outside of the valley bottoms).

Topography is represented in the model by the top of layer 1, which was set using high resolution Light Detection and Ranging land surface elevation data for the proposed mine area, and a USGS National Elevation Dataset 1-arc-second (approximately 30-meter) digital elevation model for those parts of the analysis area that are outside of the proposed mine area. V-shapes of water table elevation contours along the bottoms of valleys indicate that many streams within the analysis area were gaining at the time represented by the model calibration.

Groundwater horizontal hydraulic gradients within the alluvial deposits range from approximately 2 to 10 percent and are generally consistent with gradients of adjacent streams. Gradients in shallow bedrock are similar to gradients in the alluvial deposits, but are steeper on the mountain slopes outside of the valleys' bottoms.

Accumulated baseline groundwater level data indicate that the streams in the analysis area are primarily gaining and groundwater flow near the valley bottoms is angled (in the downstream direction) toward the gaining streams (SPF 2017).

Vertical hydraulic gradients were calculated using data collected from: 1) 10 well nests (pairs of alluvial and shallow bedrock wells with screens completed at different depths); 2) multiport samplers installed in three bedrock boreholes; and 3) vibrating wire piezometer strings installed in two bedrock boreholes. **Figure 3.8-6** shows that upland areas exhibit strong downward gradients (positive percent values for installations MWH-B21, MGI-12-271, and MGI-12-307, indicating the presence of groundwater recharge areas outside of the mountain valleys), while the valley bottoms exhibit weak upward or downward gradients (SPF 2017). The lack of strong upward hydraulic gradients along the valley axis may be due to limited instrumentation and measurements (only boreholes MWH-B16/B17/B21 have samplers installed in deeper bedrock, and only one measurement was taken from those installations). However, it is more likely that this lack of strong upward gradients along the valley axis may indicate an absence of a larger scale, deeper groundwater system of a type described by Winter (1976) with recharge zones coinciding with high mountain ridges and slopes and discharge zones located in mountain valleys. Low permeability of the underlying bedrock likely prevents development of such a system in the analysis area.

In summary, groundwater flows follow the land surface topography, with most groundwater migrating at shallow depths down the mountain slopes and along the valley bottoms, and eventually discharging to surface streams. On a more local scale, the flow also is affected by distribution of recharge rates (influenced in turn by land elevation, lithology of surficial deposits, vegetation, weather, climate, and seasonal conditions), geology (e.g., faults, fractures, sedimentary structures, lithology – all influencing hydraulic properties of the sediments and rock formations), and existing anthropogenic features (e.g., mine workings and waste rock piles).

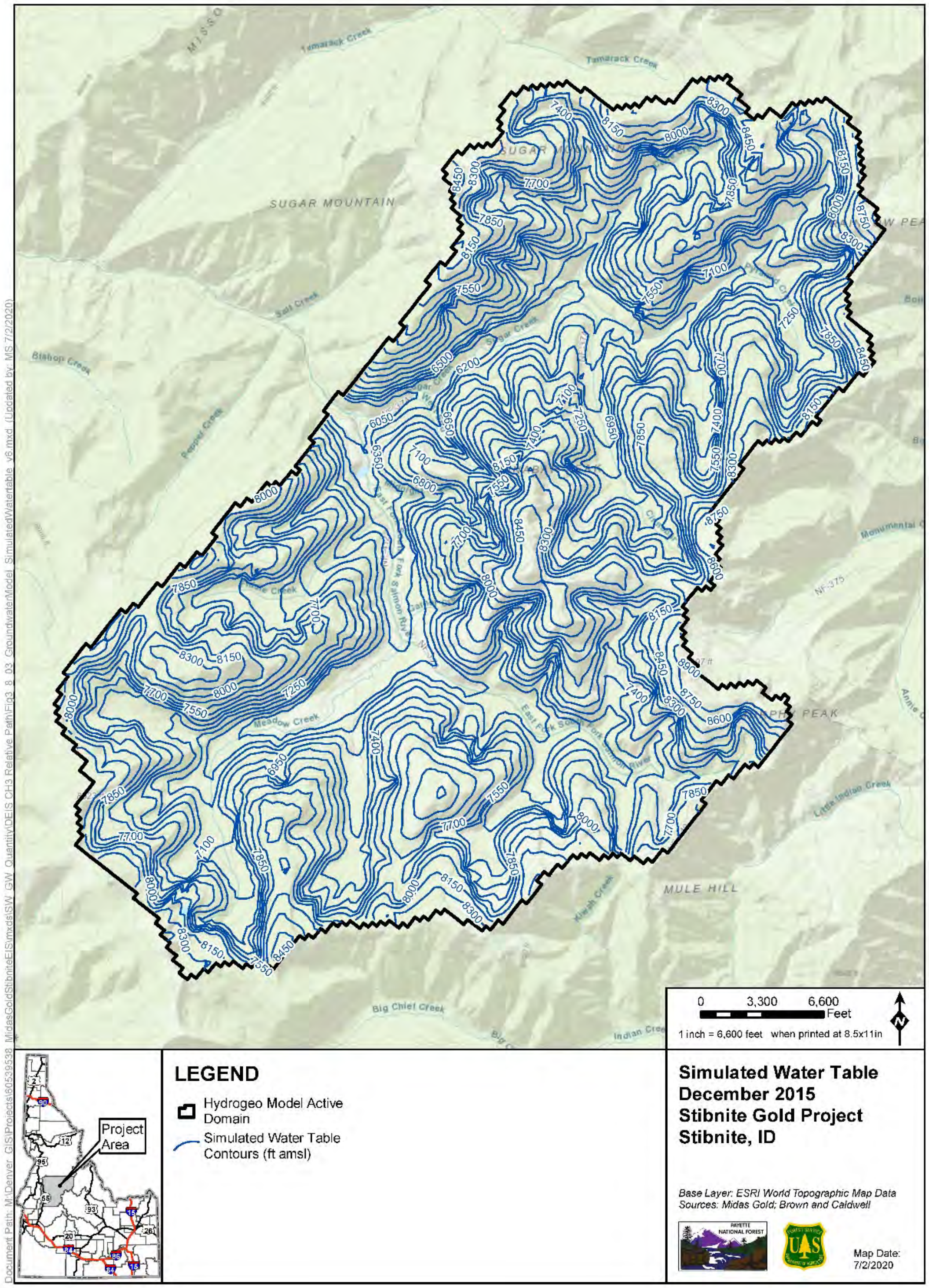

Figure Source: Brown and Caldwell 2018a – Figure 5-1.

Figure 3.8-5 Model – Simulated Water Table Contours for December 2015

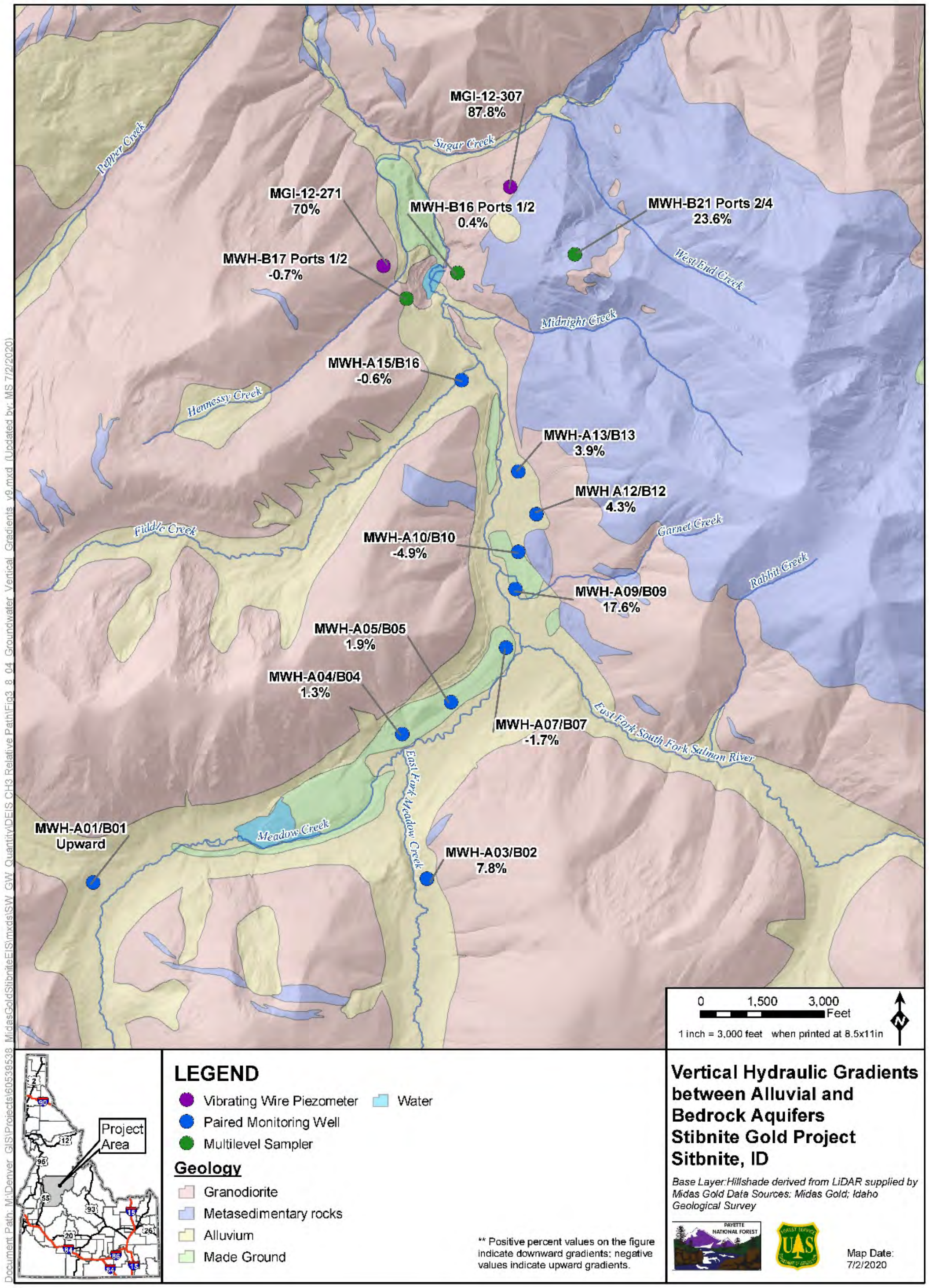

Figure Source: SPF 2017 – Figure 4-6 (note: geology content is taken Brown and Caldwell 2017 – Figure 5-2).

Figure 3.8-6 Vertical Hydraulic Gradients Between Alluvial and Bedrock Aquifers

3.8.3.2.3 HYDRAULIC CHARACTERISTICS OF GROUNDWATER-BEARING MATERIALS

Several investigators completed hydraulic testing of unconsolidated sediments and bedrock formations in the analysis area. This was done with the use of slug testing of monitoring wells, pressure injection packer testing of boreholes, and aquifer pumping tests of production wells (Brown and Caldwell 2017; SPF 2017).

3.8.3.2.3.1 Hydraulic Conductivity of Alluvial Materials

Hydraulic conductivity (K) measures the ease with which water can move through sediment pore spaces or rock fractures. It is expressed as a unit of distance over time (e.g., feet per day [feet/day]). Transmissivity (T) is a related measure, but it expresses how much water can be transmitted through a host formation of a given thickness (T = K x L, where L denotes a thickness) and is expressed in units of area over time, such as square feet per day ($feet^2$/day).

Pump based aquifer tests of the four mine site production wells (Stibnite's Hooterville and main camp domestic wells, Hecla's Pioneer well, and the Stibnite Plant utility well) completed in 1994 in the alluvium of the EFSFSR provided transmissivity values ranging from 67 to 134 $feet^2$/day. Given an average aquifer thickness of 20 feet in the area of those tested wells, the calculated hydraulic conductivities range from 3.3 to 6.7 feet/day (Brown and Caldwell 2017).

Slug tests conducted in 1996 in two alluvial monitoring wells produced hydraulic conductivity estimates averaging 4.9 feet/day. Additionally, nine slug tests conducted in 2012 on wells completed in various unconsolidated materials at proposed locations for the SGP features including the Yellow Pine pit area (six tests), Hangar Flats pit area (two tests), and proposed tailings disposal area (one test) provided estimation of hydraulic conductivities ranging from 0.3 to 139 feet/day.

A pump test of the new Camp Well (SPF 2017) conducted in 2012 provided hydraulic conductivity of 12 feet/day, calculated from transmissivity of 350 $feet^2$/day and a given average thickness for the alluvial aquifer (around the Camp Well) of 30 feet.

Slug tests conducted in 2013 in eight alluvial monitoring wells allowed estimation of average and median hydraulic conductivity values of 11.3 feet/day and 7.3 feet/day, respectively. The range of measured/estimated values was 2.8 to 28 feet/day.

Overall, the results reported by the investigations (from 1994 to 2013) for the alluvial groundwater system indicate hydraulic conductivity ranging from 1 to 100 feet/day, with an average of approximately 10 feet/day (SPF 2017).

3.8.3.2.3.2 Hydraulic Conductivity of Bedrock

Slug tests of five bedrock monitoring wells in 2013 provided hydraulic conductivity estimates ranging from 0.04 to 0.90 feet/day. The calculated average and median values were 0.4 and 0.2 feet/day, respectively (SPF 2017). Slug tests of seven bedrock monitoring wells in 1996 provided hydraulic conductivity estimates ranging from 0.15 to 4.25 feet/day, with an average value of 1.0 foot/day (SPF 2017).

Six packer tests completed in 1996 in two bedrock boreholes allowed derivation of hydraulic conductivities ranging from 1.1 to 5.9 feet/day, with average and median values of 2.8 feet/day and 2.5 feet/day, respectively (SPF 2017).

Forty-eight of the successfully completed bedrock packer tests conducted in 2012 and 2013 provided hydraulic conductivity estimates ranging from less than 0.0003 to 0.6 feet/day. The calculated geometric mean and average values were 0.01 feet/day and 0.08 feet/day, respectively (SPF 2017). Those packer test values provide lower hydraulic conductivities compared to the other studies, and were possibly affected by insufficiently flushing the boreholes of drilling mud prior to the test. If that is the case, the results would underestimate the real hydraulic conductivities of the tested rock formations.

It is uncertain if any of the boreholes subjected to packer- and/or slug -testing intercepted fault zones present in the analysis area. Uncertainties associated with hydraulic properties of the faults, and predictions of the model used to simulate groundwater flow in the analysis area, are discussed in Section 4.9.8, Model Uncertainty.

No pump-based aquifer testing was conducted in wells completed in bedrock for the analysis used in this document. However, three of the seven wells monitored during a 31-day-long Gestrin Airstrip well aquifer test conducted in December 2013 were completed in shallow bedrock. Hydraulic conductivity estimated for shallow bedrock using data collected from monitoring well MWH-B05 was 4.5 ft/day (Brown and Caldwell 2017).

Aquifer testing using bedrock well was completed in December 2019 and January 2020. However, no test data and the results of the data analysis were available at the time of writing. Once available, the new results will be used to inform later versions of this document.

Overall, the results of hydraulic testing show a large range of hydraulic conductivities for the bedrock aquifer: from less than 0.0003 feet/day (if excluding the low values derived from the 2012 and 2013 packer tests) to 5.9 feet/day. Such a broad range is expected when testing both fractured (i.e., high hydraulic conductivity) and non-fractured (i.e., low hydraulic conductivity) crystalline rock. In general, average conductivities appear to be slightly higher at shallow bedrock depths, compared to values estimated for deeper bedrock (SPF 2017).

3.8.3.2.4 GROUNDWATER PRODUCTIVITY

Aquifer pumping tests were performed in 1989, February 2012, and December 2013 at the Stibnite Gestrin airstrip well (**Figure 3.8-7**) located close to Meadow Creek, about 2,500 feet upgradient from the Meadow Creek–EFSFSR confluence, to establish alluvial aquifer characteristics in areas most likely to be impacted by mining operations. In 1989, the well was pumped at a constant rate of about 114 gallons per minute (gpm) for 300 minutes. In February 2012, the well was pumped for 480 minutes at rates ranging from 46 gpm (average for first 15 minutes) to 208 gpm (average for last 100 minutes of test). Those were the preliminary tests and the results of analysis completed using the collected data were considered uncertain (Brown and Caldwell 2017).

A more comprehensive test on the Gestrin well was conducted in December 2013. During the 2013 test, the well was pumped at an average rate of about 100 gpm for almost 31 days. Groundwater levels were monitored during the 2013 test in five alluvial wells and three shallow bedrock wells. Location of the monitoring wells are shown on Figure 8-2 of the Brown and Caldwell 2017 report, and well logs and well construction diagrams for those wells are presented in Appendix C-2 of that report. Analyzing drawdown data collected from observation wells completed in the alluvium and bedrock allowed hydraulic properties to be estimated for both formations. Hydraulic conductivities estimated from the 2013 test data are 10.2 feet/day for the alluvial aquifer and 4.5 feet/day for the shallow bedrock. These results provide documentation of groundwater productivity of the alluvial sediments and the shallow bedrock in the area of the Gestrin well (Brown and Caldwell 2017; SPF 2017).

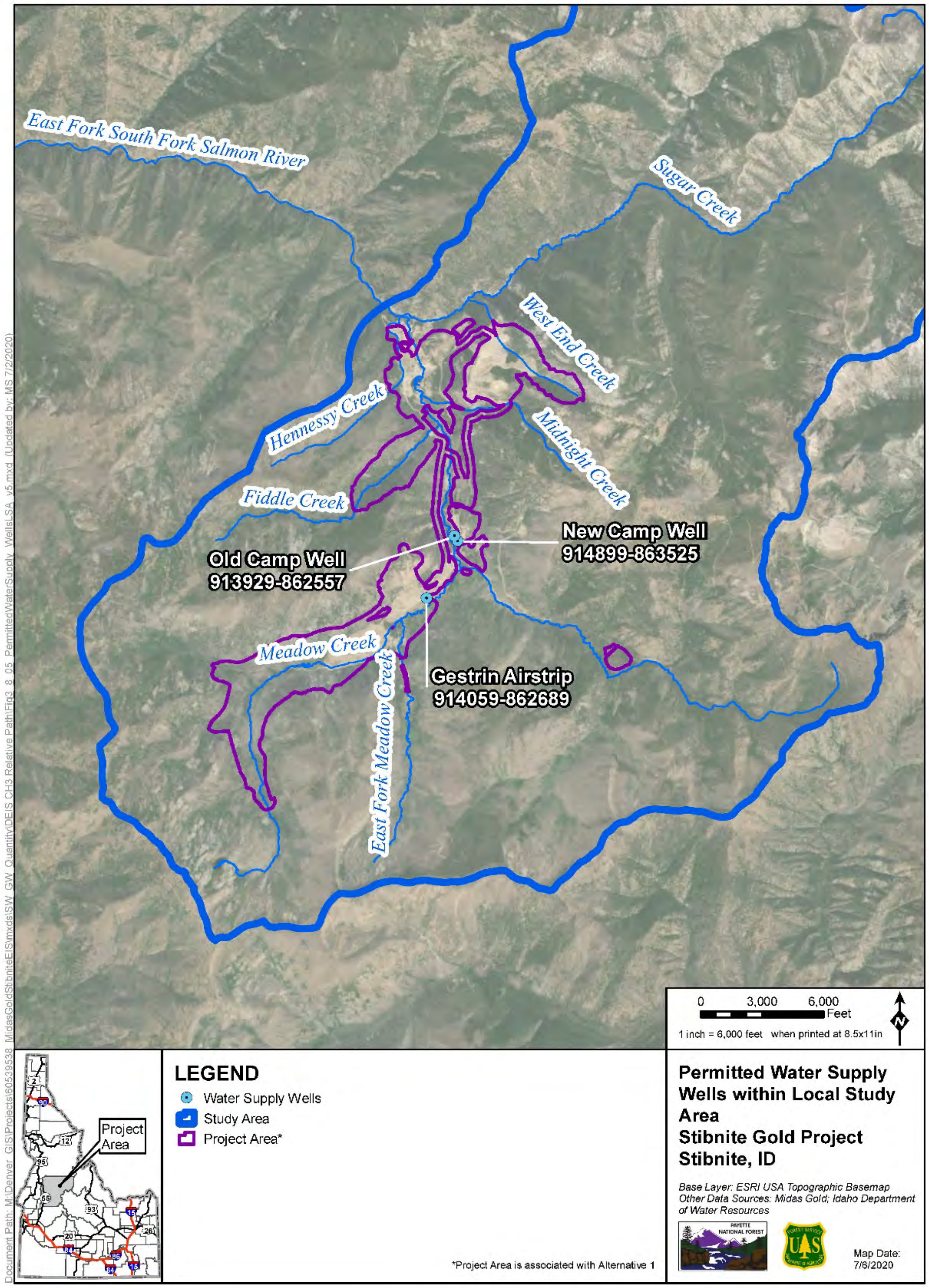

Figure Source: Brown and Caldwell 2017 – Figure 8-3

Figure 3.8-7 Permitted Water Supply Wells in the Analysis Area

3.8.3.2.5 HISTORICAL GROUNDWATER USE

IDWR records indicate that three permitted water supply wells are located at the mine site (**Figure 3.8-7**). **Table 3.8-6** provides a summary information about those wells (Brown and Caldwell 2017).

Table 3.8-6 Permitted Water Supply Wells in the Analysis Area

Well	Permit #	Diameter (inch)	Screen Depth (ft bgs)	Static Water Level (ft bgs)	Notes
The Gestrin Airstrip permitted mining well	914059-862689, Tag # D0060354	8	99 to 109	18	Date of completion: 1988, re-drilled in November 2011; is owned by Midas Gold Idaho, Inc. (Midas Gold); is located near the airstrip, completed in alluvium; discharge rate (production capacity) of 100 to 150 gpm
The original temporary Camp water supply well	913929-862557	6	58 to 72	12	Date of completion: October 1981; was permitted in 1981 in the mine shop area (Former Man Camp Well); completed in alluvium; discharge rate (production capacity) of 30 gpm. This well has not been used since 2013
The new camp water supply well	914899-863525, Tag # D0063781	8	57 to 64	14	Date of completion: 2012; is installed in alluvium on the Stibnite Road portion of the McCall Stibnite Road (County Road 50-412); discharge rate (production capacity) of 15 gpm. Brown and Caldwell (2017) state that, as of June 2017, this well has never been used, except to test the drinking water system in 2014.

Table Source: Brown and Caldwell 2017

Table Notes:

ft = feet

bgs = below ground surface.

3.8.3.2.6 SURFACE WATER AND GROUNDWATER INTERACTION

Stream elevations at most locations were measured to be slightly lower than the water table in adjacent areas, suggesting that the streams receive groundwater discharge from the alluvial aquifer. However, there are areas where the opposite is true, indicating the presence of losing stream reaches. For example, groundwater elevations suggest the following losing reaches: 1) on the EFSFSR between Garnet Creek and Fiddle Creek; 2) on the EFSFSR immediately upgradient of the Yellow Pine pit; and, 3) in the lower reach of the East Fork of Meadow Creek (SPF 2017).

Fractured bedrock likely contributes flow to hillside springs located above alluvial deposits. Springs and seeps near the northerly trending faults along the east side of both upper Meadow Creek and East Fork Meadow Creek may be related to these faults (SPF 2017).

In late summer 2012, HydroGeo (2012a) conducted a spring and seep survey. A total of 347 hydrologic sites were identified in the ten major drainages in the analysis area during the field survey. The survey identified 37 seeps, 153 seeps with wetlands, 33 springs, 117 springs with wetlands, 1 pond, 2 ponds with wetlands, 3 seep/pond/wetland complexes, and 1 reemerging creek (HydroGeo 2012a). **Figure 3.8-8** shows the locations of the surveyed spring and seep sites.

HydroGeo (2012a,b) provides the following summary of results of the 2018 spring and seep survey:

- Many of the springs or seeps at higher elevations were located near bedrock outcrops. Due to colluvial cover of the slopes, it was difficult or impossible to recognize whether the water was emanating from a bedrock source, or daylighting as unsaturated flow within the colluvium (e.g., interflow and/or throughflow).
- Springs and seeps were found in the lower Meadow Creek drainage around the spent heap leach ore disposal area.
- Most of the springs were found in alluvial or colluvial slump areas. Emerging water was often found flowing only a short distance above ground before going underground again, especially at higher elevations where snowmelt recharges the colluvial cover.
- Some of the spring and seep sites were located along road cuts. These types of springs and seeps are not naturally occurring and bear no discernible relationship to any local geologic features.
- The results of the survey indicate no clear-cut relationship between the springs and seeps and mapped geologic structures and stratigraphy. However, the investigators noted it is likely that groundwater flow in bedrock occurs preferentially along fault zones (HydroGeo 2012a).

3.8.3.3 Water Rights

Existing water rights at the mine site have been acquired by Midas Gold. The type, source, and priority date of each water right is provided in **Table 3.8-7**. Beneficial uses associated with these rights include mining activities and domestic use. No federal, state, or other private water rights exist within the analysis area. However, IDWR and the Forest Service hold minimum flow water rights downstream of the mine site on the EFSFSR, South Fork of the Salmon River, and the mainstem of the Salmon River.

Table 3.8-7 Water Rights Summary

Water Right ID	Type	Source	Diversion Point	Priority Date	Beneficial Use	Diversion Rate (cfs)	Max Total Usage (acre-feet)
77-7285	Ground-water	Well	SE ¼ of the NE ¼, Section 15, T18N, R9E	11/7/1988	Storage and Mining	0.50	39.2
77-7293	Surface Water	Unnamed Stream (Hennessy Creek)	SW ¼ of the NE ¼, Section 3, T18N, R9E	4/19/1989	Mining	0.25	20.0
77-7122	Surface Water	EFSFSR	NW ¼ of the NW ¼, Section 14, T18N, R9E	4/16/1981	Storage and Mining	0.33	7.1
77-7141	Ground-water	Well	SW ¼ of the SW ¼, Section 11, T18N, R9E	6/9/1981	Domestic	0.20	11.4

Table Source: Midas Gold 2016 (Table 8-1)

Table Notes:

cfs = cubic feet per second.

The four existing water rights at the mine site are specific to historic use related to activities in the 1980s and 1990s. While these are valid water rights, the specific points of diversion, place of use, and beneficial use may not reflect planned SGP activities and may need to be adjusted through the transfer process, or through filing additional applications for permit. It is not necessary to record a water right for the random diversion of water from a public source for fire suppression purposes. However, water used for dust control and exploration activities requires a water right.

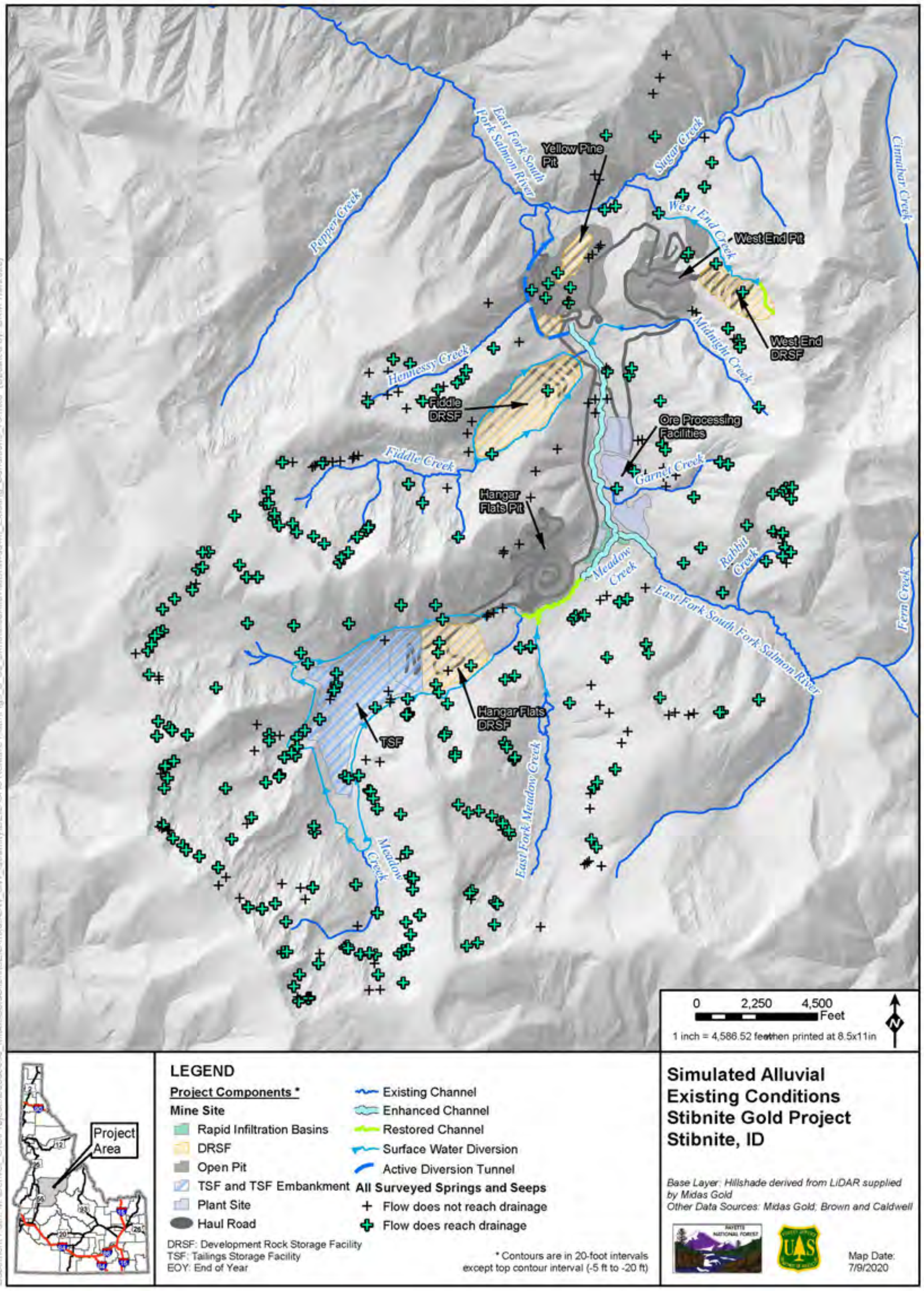

Figure Source: HydroGeo 2012a, Figure 1-3

Figure 3.8-8 Hydrology Field Survey Map

A review of IDWR water right records indicates that there are no downstream consumptive-use water rights on the EFSFSR until after the river merges with Johnson Creek (HDR, Inc. 2017). The Idaho Water Resource Board maintains minimum streamflow requirements on various rivers and creeks in the state, including the EFSFSR, which is covered under water right 77-14190. A minimum streamflow is the amount of flow necessary to preserve stream values, including protecting fish and wildlife habitat, aquatic life, navigation, transportation, recreation, water quality, or aesthetic beauty. The minimum flow varies throughout the calendar year (**Table 3.8-8**), with a base flow minimum of 173 cfs between October 1 and October 31 as measured on the EFSFSR at the confluence of the EFSFSR with the South Fork Salmon River. Water Right 77-14190 is subordinate to all future domestic, commercial, municipal, and industrial uses and future non-domestic, commercial, municipal, and industrial development up to 8.2 cfs. Further, IDWR would consider the effect of additional water rights on the Wild and Scenic eligibility values of the EFSFSR.

Table 3.8-8 State of Idaho, IDWR Water Right No. 77-14190 Minimum Stream Flow

Usage Period	Diversion Rate (cfs)
8/1 to 8/31	223
9/1 to 9/30	179
10/1 to 10/31	173
11/1 to 11/30	214
12/1 to 12/31	222
1/1 to 1/31	254
2/1 to 2/28	232
3/1 to 3/31	291
4/1 to 4/30	625
5/1 to 5/31	1,829
6/1 to 6/30	2,269
7/1 to 7/31	590
Total Diversion	2,269

Table Source: HDR, Inc. 2017

Table Notes:

cfs = cubic feet per second.

IDWR also holds a minimum streamflow water right downstream (approximately 26.4 miles from the mine site) on the South Fork of the Salmon River (77-14174). Water Right 77-14174 also is subordinate to all future domestic, commercial, municipal, and industrial uses and future non-domestic, commercial, municipal, and industrial development up to 20.6 cfs.

The U.S. Government (i.e., Forest Service) holds two water rights on the Salmon River (75-13316 and 77-11941). These are instream, non-consumptive water rights that maintain flows for the Wild and Scenic River designated segment of the Salmon River. The minimum instream flow rates provided by the water rights range from a low of 1,200 cfs for the period of September 1 to September 15 to 9,450 cfs for the period of June 1 to June 15. The total diversion rate is 13,600 cfs. The South Fork of the Salmon River joins this segment of the mainstem Salmon River approximately 64.6 miles downstream from the SGP area. These water rights are subordinated to all water rights claims filed in the Snake River Basin Adjudication as of the effective date (September 1, 2003) of the Stipulation among the United States, the State of Idaho, and other objectors. They also are subordinated to other beneficial use rights (with some caveats) such as domestic use, irrigation, and stock watering. Additional detailed information regarding these two water rights can be found in Water Right Reports (referenced by water right number) available on the IDWR website (https://idwr.idaho.gov/water-rights/).

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3.9 SURFACE WATER AND GROUNDWATER QUALITY

3.9.1 Introduction and Scope of Analysis

3.9.1.1 Analysis Area

This section describes existing conditions related to surface water quality, groundwater quality, and geochemistry. The surface water quality analysis area includes streams and lakes located in the 22 sub-watersheds that encompass the proposed mine site, access roads, transmission lines, and off-site facilities (**Figure 3.9-1**). Sub-watersheds are the hydrologic sub-basins that contain smaller tributary stream systems and are defined by the U.S. Geological Survey's (USGS) 12-digit Hydrologic Unit Codes (EnviroAtlas 2019; Seaber et al. 1987). The Surface Water Quality discussion below (Section 3.9.3.1) summarizes existing characteristics of potentially affected surface water features in the analysis area, including stream hydrology, water chemistry, and impaired stream segments. Section 3.8, Surface Water and Groundwater Quantity, provides information on existing stream flow characteristics and surface water rights.

The analysis area for groundwater quality (and quantity) includes the Sugar Creek and Headwaters East Fork South Fork Salmon River (EFSFSR) sub-watersheds (**Figure 3.8-1**), which together encompass the proposed Stibnite Gold Project (SGP) mine site infrastructure that is most likely to influence groundwater quality. The groundwater quality analysis area focuses on the mine site where excavation of mineralized and unmineralized subsurface materials would occur. It does not cover all components, such as off-site facilities or supporting infrastructure corridors, which are limited to surface disturbance activities that would not affect groundwater quality. Based on the hydrogeologic conceptual model for the groundwater quality analysis area, groundwater flow is primarily controlled by topography, with mountain-front recharge flowing through shallow fractured bedrock and colluvium to unconsolidated alluvial deposits, and eventually discharging from the unconsolidated deposits to streams, springs, and seeps. As such, groundwater flow divides likely coincide with the subwatershed boundaries that define the groundwater quality analysis area (Brown and Caldwell 2018a). The only point where groundwater is likely to flow out of the analysis area is through the alluvial aquifer at the farthest downstream point in the Headwaters EFSFSR subwatershed. Any groundwater leaving the analysis area through this boundary would eventually discharge to the EFSFSR downgradient.

The Groundwater Quality description in Section 3.9.3.2 summarizes existing water quality characteristics of the unconsolidated and fractured bedrock aquifers present in the analysis area. Section 3.8, Surface Water and Groundwater Quantity, provides specific information on groundwater levels and flow directions, aquifer hydraulic conductivity, groundwater productivity, historical groundwater use, surface water and groundwater interaction, and groundwater rights.

Finally, Section 3.9.3.3, Geochemistry, describes the geochemistry of geological features and historical mining wastes present at the mine site, and how these materials have influenced existing surface water and groundwater quality.

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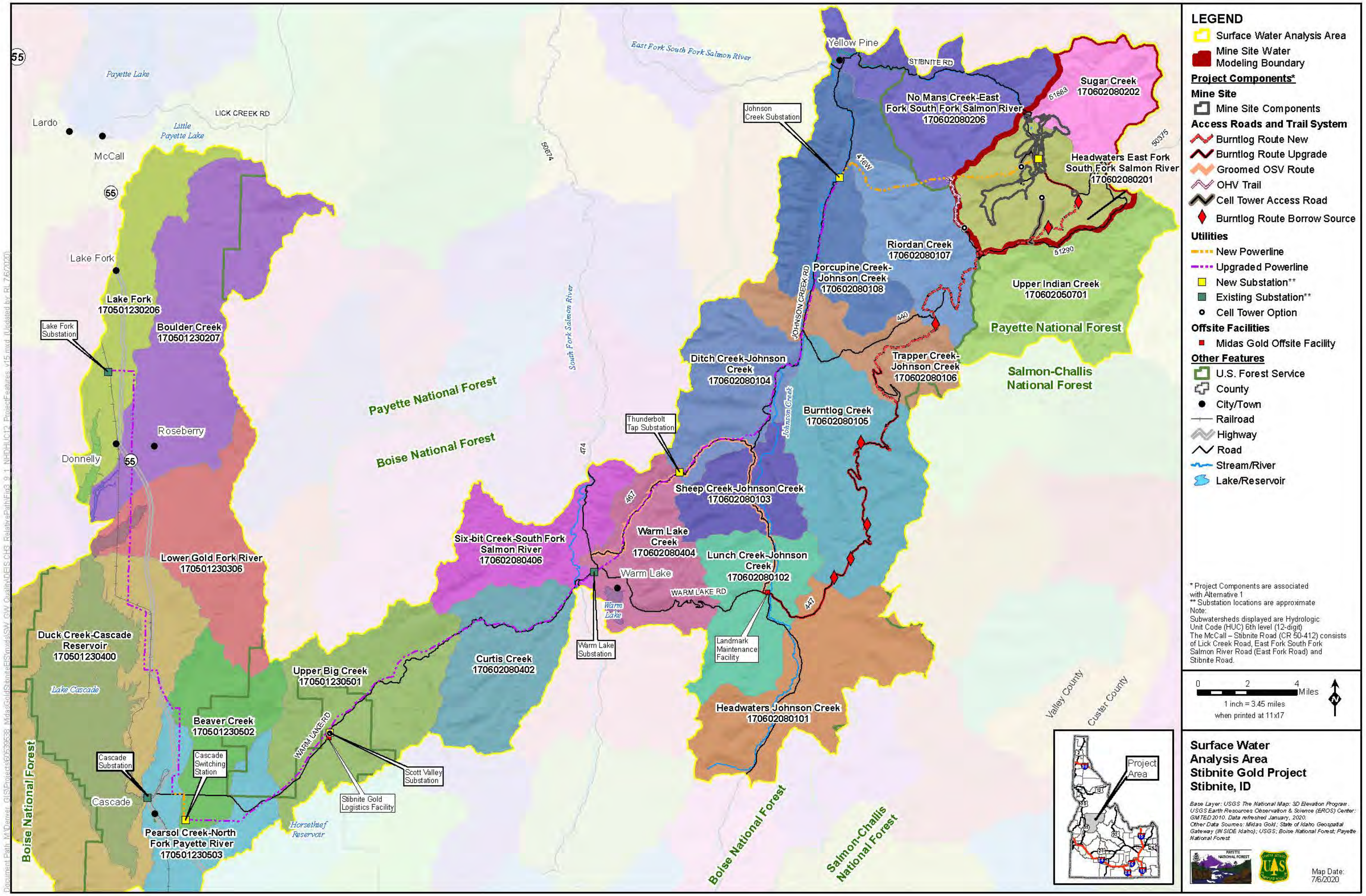

Figure Source: AECOM 2020

Figure 3.9-1 Surface Water Analysis Area

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3.9.1.2 Methodology

3.9.1.2.1 Surface Water Quality

Surface water resource investigations for the SGP were initiated in 2012 to characterize existing conditions in the analysis area. An initial hydrology field survey was performed by HydroGeo, Inc. (2012) to identify, map, and characterize existing hydrologic features. This survey helped to define monitoring locations for a surface water baseline sampling program conducted at the mine site and vicinity between 2012 and 2016 (HDR, Inc. [HDR] 2017). The objective of the surface water sampling program was to document existing water quality conditions and develop a baseline for evaluating future water quality changes. The baseline program included sample collection from 32 stream sites and 23 seep and adit seep sites. Sampling was performed on a monthly to quarterly basis for the stream locations and quarterly for the seeps and adit seeps. The collected samples were analyzed for alkalinity, anions, metals, nutrients, cyanide, hardness, methylmercury, total dissolved solids (TDS), and total suspended solids (TSS). Field parameters also were measured for each sample including dissolved oxygen, pH, conductivity, temperature, and turbidity. The sampling points monitored during the baseline study are shown on **Figure 3.9-2**.

The surface water baseline sampling was conducted under a Quality Assurance Project Plan (QAPP) and a Surface Water Quality Sampling Plan to define the data type, quantity, and quality needed to meet study objectives, and to establish standardized data collection procedures. As specified by the QAPP, quality control samples, including field duplicates, trip blanks, equipment blanks, matrix spikes, and matrix spike duplicates were collected during each sampling event at a frequency of 10 to 20 percent of the total samples. The surface water analytical data also were reviewed, verified, and validated per protocols described in the QAPP (HDR 2017).

Of the 32 stream sampling locations included in the baseline study, 10 were selected by SRK Consulting (SRK) as assessment/prediction nodes for surface water quality modeling (SRK 2018a). The 10 assessment nodes are listed in **Table 3.9-1** and are depicted on **Figure 3.9-3**. The assessment nodes were selected from the existing stream sampling points based on their location downstream of future mining facilities, such as the mine pits, tailings storage facility, and development rock storage facilities (DRSFs). Each assessment node was sampled approximately 45 times between 2012 and 2018.

Understanding the baseline water chemistry at these monitoring locations is critical because the assessment nodes provide a benchmark for evaluating future water quality impacts from the SGP (Section 4.9, Environmental Consequences Surface Water and Groundwater Quality).

Table 3.9-1 Surface Water Monitoring Locations Selected as Assessment/Prediction Nodes

Monitoring Location (Assessment/ Prediction Node)	Location	Drainage
YP-T-27	Meadow Creek above East Fork Meadow Creek	Meadow Creek
YP-T-22	Meadow Creek below East Fork Meadow Creek and above EFSFSR	Meadow Creek
YP-SR-10	EFSFSR below Meadow Creek	EFSFSR
YP-SR-8	EFSFSR below Garnet and Scout Creeks and above Fiddle Creek	EFSFSR
YP-T-11	Lower Fiddle Creek	Fiddle Creek
YP-SR-6	EFSFSR above Yellow Pine pit	EFSFSR
YP-SR-4	EFSFSR below Yellow Pine pit	EFSFSR
YP-T-6	Lower West End Creek	Sugar Creek
YP-T-1	Sugar Creek above EFSFSR	Sugar Creek
YP-SR-2	EFSFSR below Sugar Creek	EFSFSR

Table Source: HDR 2017

3.9.1.2.2 GROUNDWATER QUALITY

A groundwater baseline sampling program was conducted at the mine site between 2012 and 2016 (HDR 2016). The objective of the sampling program was to define and characterize groundwater quality conditions at and near areas where groundwater could be impacted by proposed mining activities. The baseline program included sample collection from 31 monitoring wells installed under the direction of two independent engineering companies (i.e., MWH Americas, Inc. [MWH] and SRK). Of the 31 monitoring wells, 19 were completed in various alluvial aquifers and 12 were installed in bedrock. The collected samples were analyzed for alkalinity, anions, metals, nutrients, cyanide, hardness, methylmercury, and TDS. Field parameters also were measured for each sample including dissolved oxygen, oxidation-reduction potential, pH, conductivity, temperature, and turbidity. The sampling points monitored during the baseline study are shown on **Figure 3.9-4** (alluvial wells) and **Figure 3.9-5** (bedrock wells). Monitoring wells installed in the alluvial aquifers have a suffix beginning with the letter “A,” and those wells completed in the bedrock aquifer have a suffix beginning with the letter “B.”

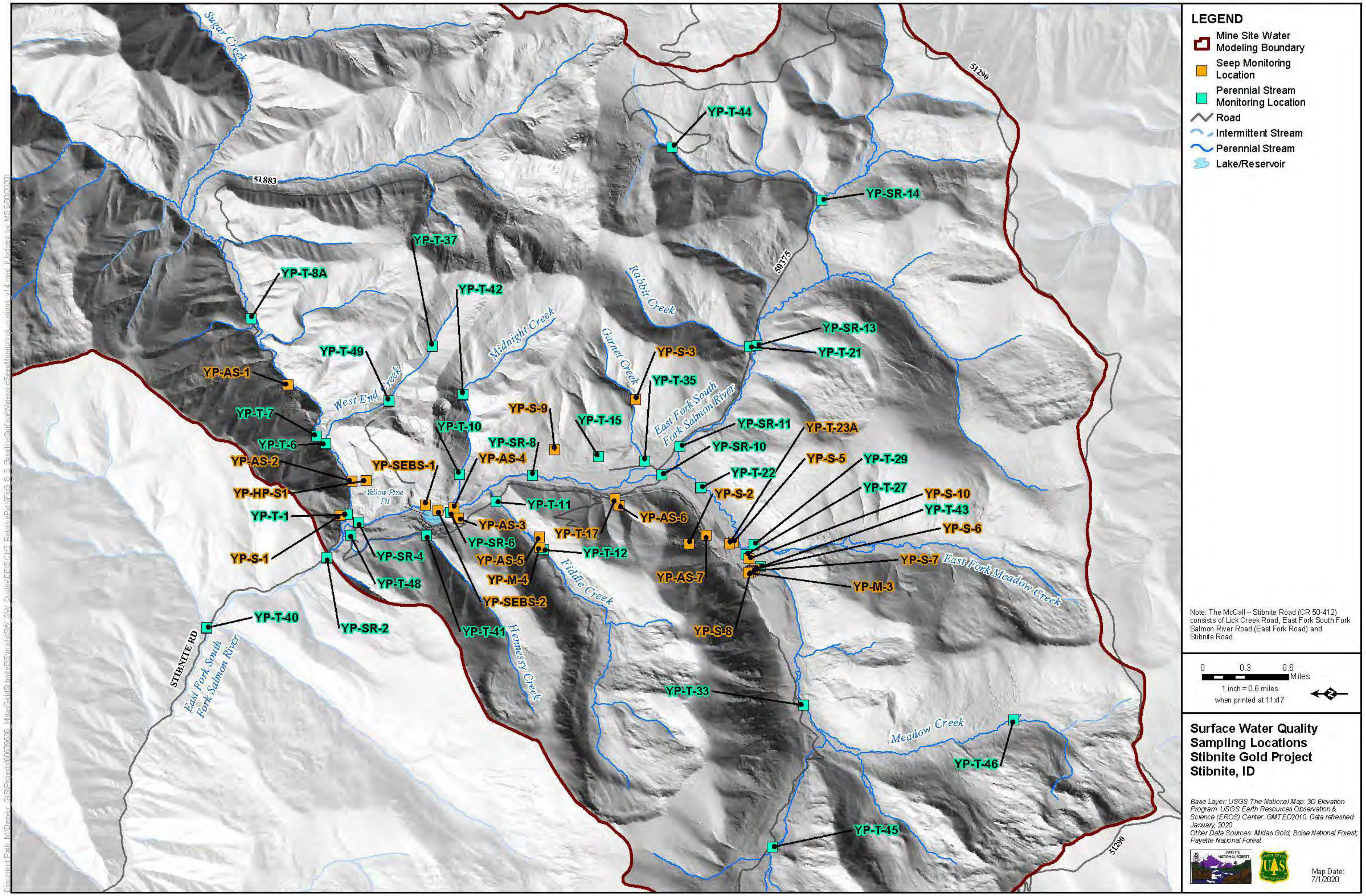

Figure Source: AECOM 2020

Figure 3.9-2 Surface Water Quality Sampling Locations

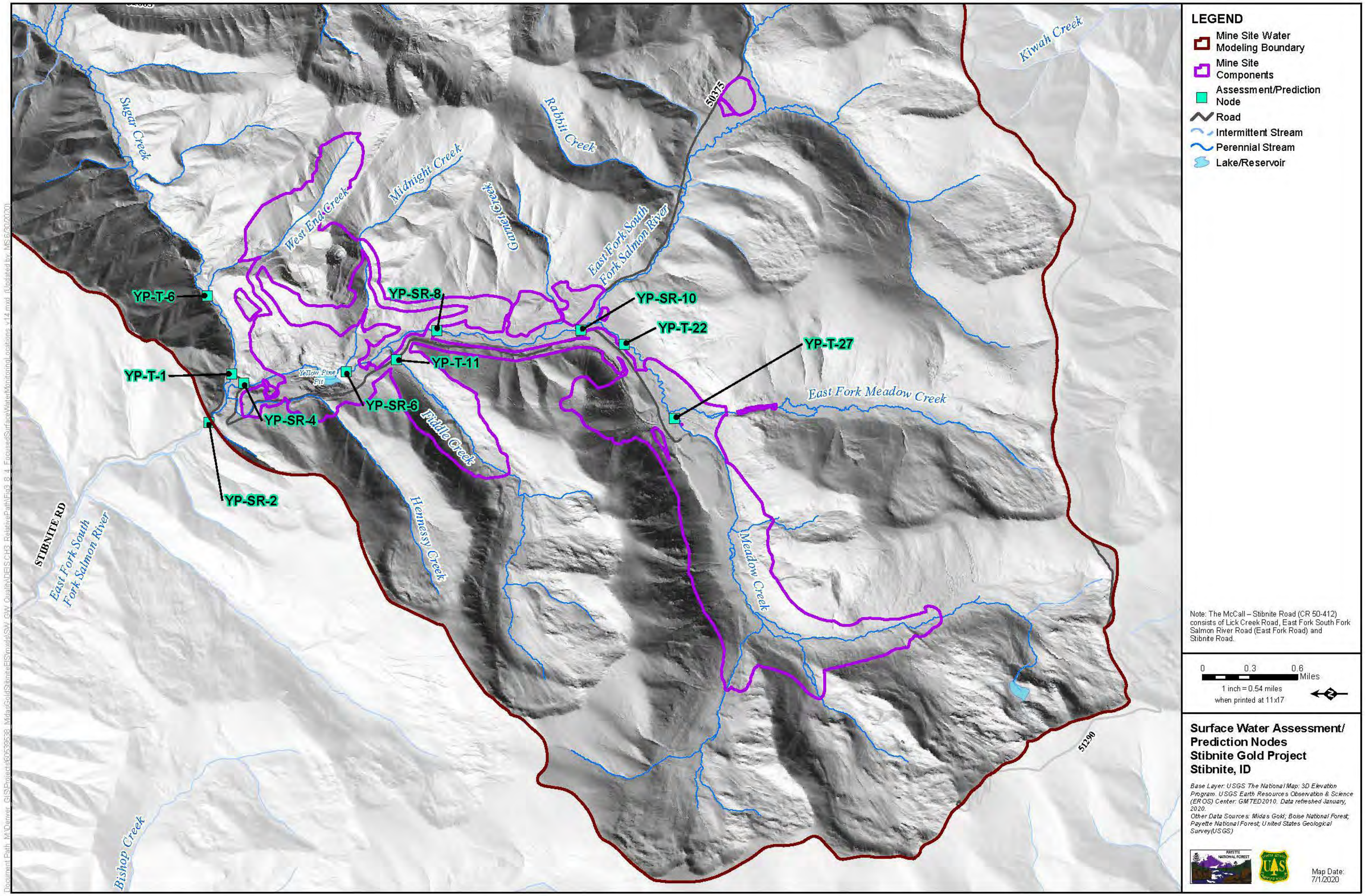

Figure Source: AECOM 2020

Figure 3.9-3 Surface Water Assessment/Prediction Nodes

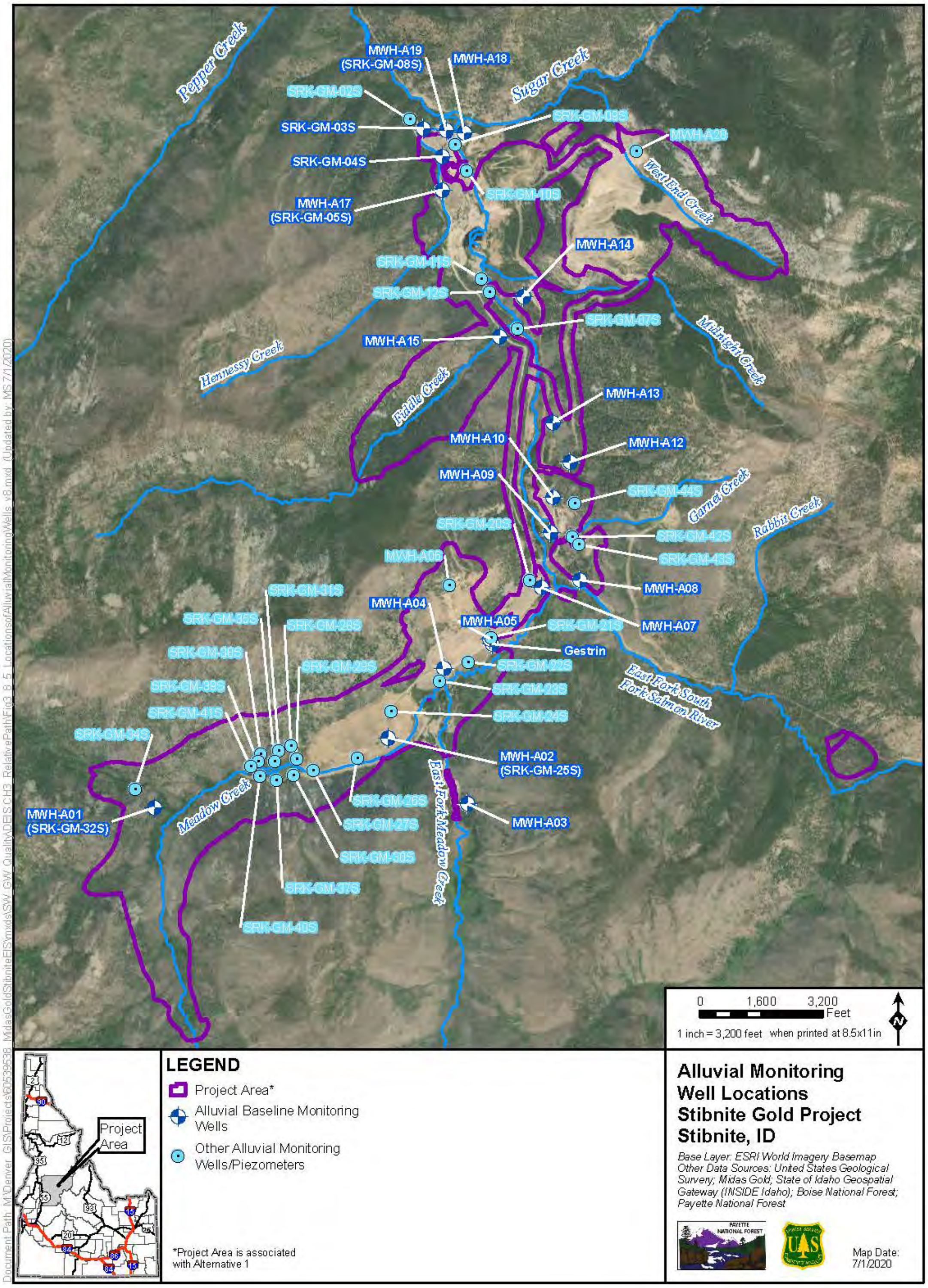

Figure Source: AECOM 2020

Figure 3.9-4 Alluvial Monitoring Well Locations

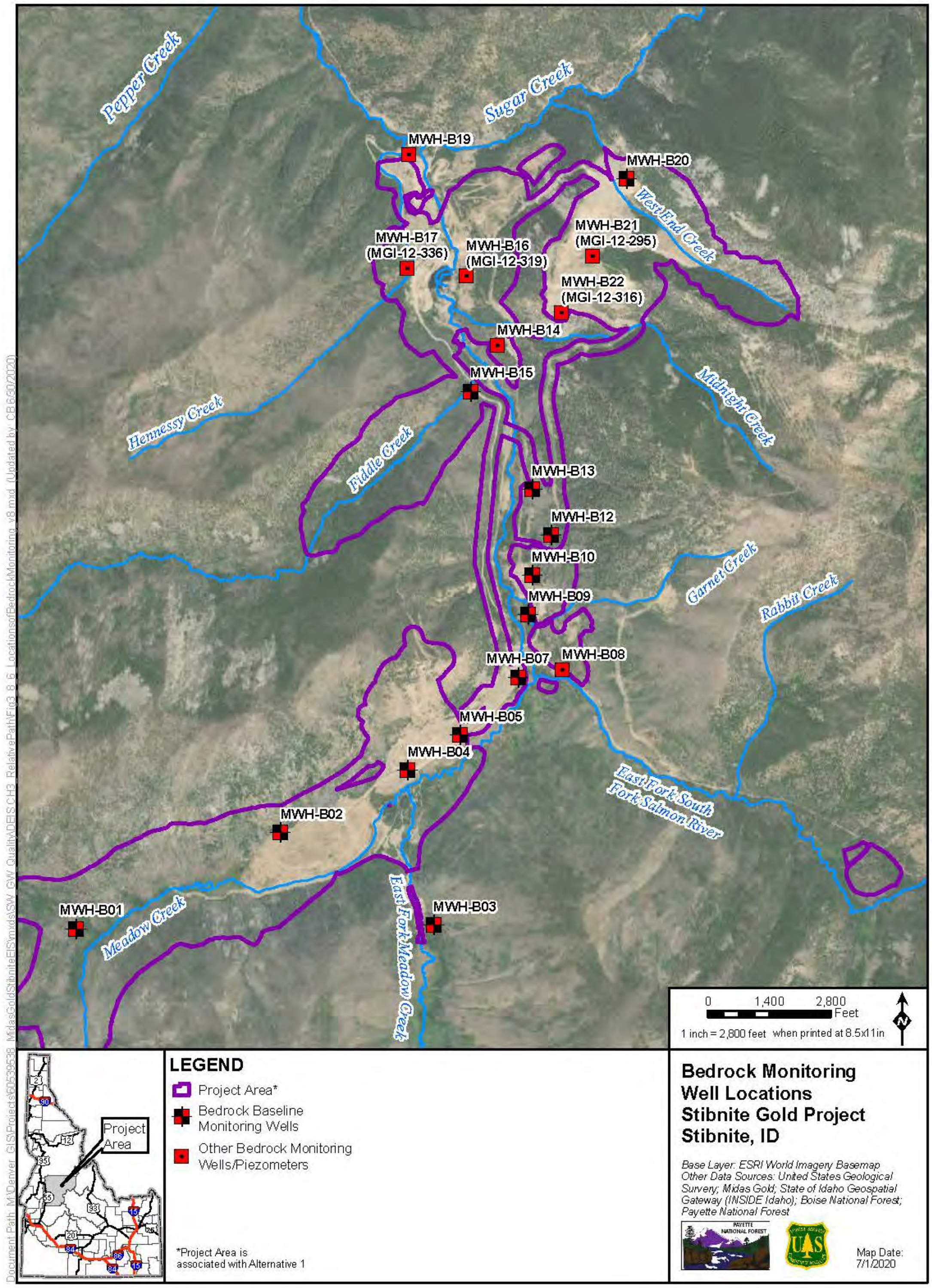

Figure Source: AECOM 2020

Figure 3.9-5 Bedrock Monitoring Well Locations

The groundwater baseline sampling was conducted under a QAPP and a Groundwater Quality Sampling Plan to define the data type, quantity, and quality needed to meet study objectives, and to establish standardized data collection procedures. As specified by the QAPP, quality control samples, including field duplicates, equipment blanks, matrix spikes, and matrix spike duplicates were collected during each sampling event at a frequency of one per ten primary samples. The groundwater analytical data also were reviewed, verified, and validated per protocols described in the QAPP (HDR 2016).

Of the 31 monitoring wells included in the baseline study, 17 locations are especially important for the water quality analysis because they define baseline chemistry in the upgradient, unmineralized portion of the mine site; downgradient of legacy mine wastes; or in areas where proposed mine facilities would be constructed. The baseline water chemistry at these sampling locations represents the existing condition against which modeled water quality predictions will be compared to evaluate changes arising from the SGP and alternatives (Section 4.9, Environmental Consequences Surface Water and Groundwater Quality). The monitoring wells of interest are discussed further in Section 3.9.3.2, Groundwater Quality, below.

3.9.1.2.3 GEOCHEMISTRY

A baseline geochemical characterization study also was completed for the mine site by SRK (2017). The primary purpose of the study was to develop baseline geochemical data to support planning and impact assessment for the SGP. The baseline study involved the collection and analysis of a combined 704 samples representative of future development rock, ore, and mill tailings associated with the proposed mining. It also included an assessment of historical mining waste rock from the spent ore disposal area (SODA) and Bradley dumps to evaluate the suitability of these wastes for use as construction material. The geochemical dataset resulting from the baseline study contains samples representative of both existing mine waste rock and future materials that would be extracted by the SGP.

The baseline geochemical characterization study (SRK 2017) included results from both static and kinetic geochemical testing. Static tests evaluate the balance of acid generating and acid consuming reactions and also may be used to estimate the potential magnitude of metals leaching from a given material. Based on the results of static testing, materials that exhibit a potential to release metals to the environment may require further characterization using kinetic test methods.

Kinetic testing provides an indication of potential metal leaching and acid generation under laboratory conditions that can be used in numerical assessment of mine waste weathering. Kinetic tests are used to assess the temporal variations that may occur in leachate chemistry as a result of long-term changes in oxidation, dissolution, and desorption/reaction rates. For the SGP, kinetic testing was performed in multiple phases, with the Phase 1 kinetic test results presented in the baseline study and the Phase 2 results documented in subsequent submittals (SRK 2018b, 2019). Static and kinetic test data provide the basis for predicting and quantifying future SGP-related water quality impacts. Results from kinetic testing are summarized in

Section 4.9.2.1.1.4, Predicted Leachate Chemistry of Development Rock and Tailings. Results of the static testing can be obtained from the baseline geochemical study (SRK 2017).

3.9.2 Relevant Laws, Regulations, Policies, and Plans

3.9.2.1 Federal Regulations

Federal laws that apply to water quality include the Clean Water Act (CWA) and the Safe Drinking Water Act. The U.S. Environmental Protection Agency (EPA) is responsible for enforcing the federally-mandated CWA. Section 402 of the CWA, which authorizes the National Pollutant Discharge Elimination System permit program, controls water pollution by regulating point sources that discharge pollutants into waters of the U.S. On June 5, 2018, EPA approved the Idaho Pollutant Discharge Elimination System Program and authorized the transfer of permitting authority to the state beginning on July 1, 2018. EPA will retain the authority to issue National Pollutant Discharge Elimination System permits for facilities located on tribal lands and/or discharging to tribal waters.

EPA's other responsibilities under Section 404 of the CWA include promulgating and interpreting environmental criteria used in evaluating permit applications under Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged or Fill Material; coordinating with the U.S. Army Corps of Engineers (USACE) in the review of Section 404 permit applications; and sharing responsibility with the USACE in determining the geographic scope of CWA jurisdiction. Section 311 of the CWA also gives EPA regulatory authority with regard to spill prevention, control, and countermeasure plans required for oil storage. Facilities with aboveground and underground storage tanks in excess of specific thresholds are required to develop and implement a Spill Prevention, Control, and Countermeasure Plan.

Under the Safe Drinking Water Act, EPA has established primary and secondary maximum contaminant levels (MCLs) to protect the public against consumption of drinking water contaminants that present a risk to human health. The MCL is the maximum allowable amount of a contaminant in drinking water that is delivered to a consumer (EPA 2018a,b).

In addition, EPA has established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 constituents. EPA does not enforce these secondary MCLs. They were established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These constituents are not considered a risk to human health.

3.9.2.2 State Regulations

3.9.2.2.1 Surface Water Quality

The Idaho Department of Environmental Quality (IDEQ) implements the CWA in Idaho and regulates waterbodies in the state under its jurisdiction to meet their designated beneficial uses and Idaho water quality standards. **Table 3.9-2** lists the strictest potentially applicable surface water quality criteria used in the water quality analysis in the Environmental Impact Statement. These standards represent a combination of drinking water and cold-water aquatic life criteria that provide a benchmark for evaluating baseline water quality at the mine site and predicted concentration changes resulting from the SGP alternatives described in Section 4.9, Surface Water and Groundwater Quality.

IDEQ administers the Idaho Pollutant Discharge Elimination System program regulating discharges of pollutants into waters of the U.S. under its jurisdiction as described in the state's program application. EPA has approved the State's implementation plan that transfers the administration of specific program components from EPA to the State over a 4-year period in accordance with the Memorandum of Agreement between IDEQ and EPA Region 10. Per this memorandum, EPA will oversee IDEQ administration of the Idaho Pollutant Discharge Elimination System program on a continuing basis for consistency with the CWA, Idaho laws and rules, and all applicable federal regulations (IDEQ and EPA 2016).

Projects that may result in a discharge to waters of the U.S. require Water Quality Certification under Section 401 of the CWA. IDEQ is the regulatory authority for Section 401 permitting in Idaho. The IDEQ must grant (with or without conditions), deny, or waive Section 401 certification for any project in Idaho that requires a federal permit or license under the CWA before the federal permit or license can be granted, including the Section 404 permit issued by the USACE. This Water Quality Certification is designed to ensure that a federally-approved project would comply with state water quality standards for surface water and any other water quality requirements under state law.

The CWA also requires the state to prepare a report listing the current condition of all state waters and those waters that are impaired and in need of a total maximum daily load. The first list is referred to as the Section 305(b) list; the second is the Section 303(d) list. Both lists are named in accordance with the sections of the CWA where they are defined; together, and with additional supplementary information, they are known as the Integrated Report.

Impaired waters on the Section 303(d) list are simply a subset of those on the Section 305(b) list. The current applicable report is IDEQ’s 2016 Integrated Report (IDEQ 2018).

The Idaho Nonpoint Source Management Plan describes the state’s strategy for addressing nonpoint source pollution collaboratively with local, state, and federal partners, and provides guidance on evaluating and measuring success in meeting water quality goals for the state (IDEQ 2015). IDEQ’s role in nonpoint source management as it relates to mining and natural resource extraction includes the following:

- Assist mining operators to characterize hydrogeological conditions and background groundwater quality prior to initiating mining activities;
- Conduct monitoring and total maximum daily load development;
- Conduct site investigations and inspections as necessary;

- Focus on site cleanup and remediation in areas where mining activities have contaminated soils and surface water; and
- Provide technical assistance to responsible state and federal agencies and private organizations/owners as requested.

Under Idaho's Rules for Ore Processing by Cyanidation (Idaho Administrative Procedures Act [IDAPA] 58.01.13), mining facilities that use cyanide in their mineral extraction processes are required to obtain a permit from IDEQ. IDAPA 58.01.13 establishes procedures and requirement for the issuance and maintenance of permits to construct, operate, and close that portion of a cyanidation facility that is intended to contain, treat, or dispose of process water or process contaminated water containing cyanide. The provisions of these rules also establish requirements for water quality protection which address performance, construction, operation, and closure of a cyanidation facility. The rules are intended to ensure that pollutants associated with the cyanidation process are safely contained, controlled, and treated so that they do not endanger public safety or the environment, or interfere with beneficial use of waters of the state.

In addition to regulations enforced by IDEQ, the Idaho Department of Water Resources (IDWR) regulates stream channels under the Idaho Stream Channel Protection Act. This act requires that a Stream Channel Alteration Permit be obtained from IDWR before any type of channel alteration work, including removal and/or fill and installation of in-water or over-water structures with the potential to affect flow, within the beds and banks of a continuously flowing stream. IDWR, the USACE, and the Idaho Department of Lands have established a joint process for activities impacting jurisdictional waterways that require review and/or approval of both the USACE and the State of Idaho. Additionally, IDWR regulates water dams (which may apply to SGP contact water storage ponds) and mine tailings impoundments with dams higher than 30 feet.

3.9.2.2.2 GROUNDWATER QUALITY

The Idaho Ground Water Quality Rule (IDAPA 2011) establishes minimum requirements for the protection of groundwater by setting standards and beneficial uses and categorizing aquifers to be protected at different levels. The protection levels in IDAPA 58.01.11, summarized in **Table 3.9-2**, include both primary and secondary numerical groundwater quality standards promulgated by IDEQ to protect human health and the environment. These standards apply to *in situ* groundwater, as well as water that infiltrates to groundwater through artificial recharge such as the rapid infiltration basins planned for the SGP (see Section 2.3.5.9, Surface Water and Groundwater Management, Groundwater Management, Rapid Infiltration Basins). After groundwater or artificial recharge through the rapid infiltration basins reaches surface water, the surface water quality standards shown in **Table 3.9-2** would apply.

The IDEQ is responsible for coordinating and administering groundwater quality protection programs in the state of Idaho. IDEQ also is responsible for establishing a point of compliance location, if requested by a mine operator and pursuant to the Idaho Ground Water Quality Rule (IDAPA 2011), where groundwater and surface water downgradient of mining activity must meet established water quality standards.

Table 3.9-2 Surface Water and Groundwater Quality Guidelines Used in the Water Quality Analysis

Parameter	Units	Groundwater Quality Standard Value (1)	Surface Water Quality Standard Value (2)	Surface Water Standard Source
pH	s.u.	6.5-8.5 S	6.5-9.0	IDAPA 58.01.02 – Aquatic Life Use
Alkalinity, Total	mg/L as $CaCO_3$	---	>20	EPA Freshwater Aquatic Life Criteria
Aluminum	mg/L	0.2 S	0.05 t	EPA Secondary Drinking Water Standard
Antimony	mg/L	0.006 P	0.0052 d	IDAPA 58.01.02 – Human Health
Arsenic	mg/L	0.05 P	0.010 t	IDAPA 58.01.02 – Human Health
Barium	mg/L	2 P	2 t	EPA Drinking Water MCL
Beryllium	mg/L	0.004 P	Narrative	IDAPA 58.01.02
Cadmium	mg/L	0.005 P	0.00033(2) d	IDAPA 58.01.02 - CCC (chronic)
Chloride	mg/L	250 S	230	EPA Freshwater Aquatic Life Criteria
Chromium, Total	mg/L	0.1 P	0.1 t	EPA Drinking Water MCL
Copper	mg/L	1.3 P	0.0024(3) d	IDAPA 58.01.02 – CCC (chronic)
Cyanide, Total	mg/L	0.2 P	0.0039	IDAPA 58.01.02 – Human Health
Cyanide, WAD	mg/L	---	0.0052	IDAPA 58.01.02 - CCC (chronic)
Iron	mg/L	0.3 S	0.3 t	EPA Secondary Drinking Water Standard
Fluoride	mg/L	4 P	2	EPA Secondary Drinking Water Standard
Lead	mg/L	0.015 P	0.0009(2) d	IDAPA 58.01.02 – CCC (chronic)
Manganese	mg/L	0.05 S	0.05 t	EPA Secondary Drinking Water Standard
Mercury	mg/L	0.002 P	0.000012 tr	IDAPA 58.01.02 - CCC (chronic)
Methylmercury (fish tissue)	mg/kg	---	0.3	IDAPA 58.01.02 – Human Health
Nickel	mg/L	---	0.024(2) d	IDAPA 58.01.02 – CCC (chronic)
Nitrate + nitrite	mg/L	10 P	---	N/A
Selenium	mg/L	0.05 P	0.0015 t	EPA Freshwater Aquatic Life Criteria
Silver	mg/L	0.1 S	0.0007(2) d	IDAPA 58.01.02 - CMC (acute)
Sulfate	mg/L	250 S	250	EPA Secondary Drinking Water Standard
Total Dissolved Solids	mg/L	500 S	500	EPA Secondary Drinking Water Standard

Parameter	Units	Groundwater Quality Standard Value (1)	Surface Water Quality Standard Value (2)	Surface Water Standard Source
Thallium	mg/L	0.002 P	0.000017 d	IDAPA 58.01.02 – Human Health
Zinc	mg/L	5 S	0.054(2) d	IDAPA 58.01.02 – CMC/CCC (acute/chronic)

Table Sources: IDAPA 58.01.11; IDAPA 58.01.02; EPA 2018a,b, 2019

Table Notes:

1 Groundwater standards obtained from IDAPA 58.01.11.

2 Strictest potentially applicable surface water quality standard.

3 The criteria for these metals are hardness-dependent. The values listed are based on the EFSFSR hardness of 40 mg/L as calcium carbonate, which represents the 5th percentile hardness during the driest four months at node YP-SR-10 between April 2012 and May 2019.

4 Copper criterion was derived using the Biotic Ligand Model per guidance contained in IDEQ (2017). A conservative chronic copper standard was estimated by applying the lowest of the 10th percentile chronic criteria based on regional classifications for the Salmon River Basin, Idaho Batholith, and third order streams. Per the SGP Water Quality Management Plan (Brown and Caldwell 2020), preliminary calculations using the Biotic Ligand Model and site-specific data have produced similar values to the standard derived using these regional classifications.

Narrative = No numeric human health standard has been established for beryllium. However, permit authorities will address beryllium in National pollutant Discharge Elimination System permit actions using the narrative criteria for toxics in Section 200 of IDAPA 58.01.02, which states: “Surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses. These substances do not include suspended sediment produced as a result of nonpoint source activities.”

s.u. = standard units.

mg/L = milligrams per liter.

mg/kg = milligrams per kilogram.

$CaCO_3$ = calcium carbonate.

--- = Indicates no standard for this constituent.

P = primary constituent standard.

S = secondary constituent standard.

d = dissolved fraction.

t = total fraction.

tr = total recoverable.

N/A = Not Applicable.

3.9.2.3 County Regulations

The Valley County Land Use and Development Ordinances have provisions for well head protection. These regulations would likely apply to any drinking water wells installed. The well head protection regulations control the siting of drinking water wells and prevent wells and their potential capture zones from being installed near potential sources of groundwater contamination.

3.9.2.4 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for surface water and groundwater quality and include various objectives, guidelines, and standards for this purpose.

3.9.3 Existing Conditions

The Existing Conditions section for water quality is based on water quality data collected by Midas Gold Idaho, Inc (Midas Gold), their consultants, and the USGS. Surface water quality and groundwater quality baseline studies were summarized in reports by HDR (HDR 2016, 2017). Analytical data presented in the HDR reports were compiled from samples collected over a 4-year period between 2012 and 2016. Additional summary and analysis of the baseline study results were provided in the Stibnite Gold Project Water Resources Summary Report (Brown and Caldwell 2017). Since these initial baseline studies were published, two additional years of data were collected and tabulated in the Stibnite Gold Project Water Quality Summary Report, 2012 – 2018 (Midas Gold 2019), and data collection is still ongoing. Additionally, the USGS collected a series of surface water quality samples in the study area between 2011 and 2017, with the study results and data analysis published in two separate reports (Baldwin and Etheridge 2019; Etheridge 2015). Analytical data, statistics, and trends from the USGS and SGP baseline studies were used to characterize existing surface water and groundwater quality at the mine site.

3.9.3.1 Surface Water Quality

For a discussion of the mine site surface water hydrology and the sub-watersheds that comprise the analysis area, see Section 3.8.3.1, Surface Water, Section 3.8.3.1.1, Mine Site.

3.9.3.1.1 MINE SITE

This section focuses on quantifying the baseline water chemistry at the 10 surface water assessment node sampling locations. The discussion of baseline chemistry is organized around the water quality indicators, which include pH, temperature, major cations and anions, TDS, metals, methylmercury, sediment content, and organic carbon. It should be noted that baseline water quality at the mine site is influenced by both natural mineralization and historical mining activity (Baldwin and Etheridge 2019). Locally, remnant features from historical mining include underground mine workings; multiple open pits; development rock dumps, piles, and tailings deposits; heap leach pads and spent heap leach ore piles; contaminated soils from the former mill and smelter sites; former surface water diversions, dams, townsites, and roads; and an abandoned water diversion tunnel (Midas Gold 2016). The geochemistry subsection (Section 3.9.3.3) describes the influence of historical mining wastes on surface water quality.

3.9.3.1.1.1 Major Ions, pH, and TDS

The average baseline major ion chemistry for the surface water assessment nodes is summarized in **Table 3.9-3** and depicted on a trilinear diagram as **Figure 3.9-6**. The trilinear diagram shows that the average major ion chemistry was consistent across the Meadow Creek, EFSFSR, and Sugar Creek sampling locations during the baseline monitoring period. This is evident from the “cluster” of data points associated with the Meadow Creek, EFSFSR, and Sugar Creek samples on the diamond portion of the plot. The EFSFSR and Sugar Creek sampling locations each exhibit a calcium-magnesium-bicarbonate water type, meaning that calcium and magnesium are the dominant cations in solution, and bicarbonate is the dominant anion. The samples from Meadow Creek had on average a higher relative proportion of calcium and are therefore classified as calcium-bicarbonate water.

Average TDS concentrations also were consistent in the Meadow Creek and EFSFSR sampling locations. The average TDS ranged from 56 to 57 mg/L in the Meadow Creek samples and appears to increase downstream in the EFSFSR from about 53 mg/L in the farthest upstream reach (YP-SR-10) to 67 mg/L in the downstream reaches. It appears that despite the higher TDS load in Sugar Creek (116 mg/L), the creek does not appreciably contribute to TDS concentrations in the EFSFSR, based on the similar average TDS concentrations obtained for the EFSFSR sampling points located just upstream (YP-SR-4) and downstream (YP-SR-2) of the Sugar Creek confluence.

Baseline samples from Fiddle Creek exhibited a slightly different water quality signature compared to the EFSFSR and Meadow Creek. Although Fiddle Creek is classified as a calcium-bicarbonate water, the creek has a lower proportion of magnesium and a higher proportion of sodium compared to the other monitoring locations. It also has a lower proportion of sulfate and higher proportion of bicarbonate. Some of these differences may be due to the relatively low average TDS concentration observed in Fiddle Creek during the baseline monitoring period (36 mg/L). The low sulfate and TDS concentrations also could point to a lack of mineralized deposits and historical mining-related impacts in the Fiddle Creek drainage, and different lithologies in the catchment area, specifically calcareous rock formations.

Table 3.9-3 Average Major Ion Chemistry for Surface Water Assessment/Prediction Nodes

Sampling Point	Stream	No. Samples	pH	Hardness as $CaCO_3$	Bicarbonate as $CaCO_3$	Calcium	Chloride	Magnesium	Potassium	Sodium	Sulfate	TDS	Water Type
YP-T-27	Meadow Creek	45	7.3	37.4	38.4	11.5	1.25	2.13	0.87	2.44	5.97	57	Calcium-bicarbonate
YP-T-22	Meadow Creek	45	7.4	37.5	39.5	11.3	1.00	2.18	0.84	2.42	5.16	56	Calcium-bicarbonate
YP-SR-10	EFSFSR	45	7.4	35.3	38.7	10.3	0.63	2.25	0.78	2.12	4.15	53	Calcium-magnesium-bicarbonate
YP-SR-8	EFSFSR	45	7.5	39.1	42.2	11.4	0.73	2.55	0.83	2.36	6.77	60	Calcium-magnesium-bicarbonate
YP-SR-6	EFSFSR	45	7.4	39.0	40.3	11.4	0.68	2.54	0.83	2.34	6.44	58	Calcium-magnesium-bicarbonate
YP-SR-4	EFSFSR	45	7.5	43.8	42.5	12.7	0.63	2.89	0.88	2.30	8.86	65	Calcium-magnesium-bicarbonate
YP-SR-2	EFSFSR	45	7.6	48.4	48.1	14.4	0.52	3.01	0.85	2.31	9.31	67	Calcium-magnesium-bicarbonate
YP-T-11	Fiddle Creek	45	7.2	17.3	24.9	5.66	<0.20	0.74	0.54	2.21	1.74	36	Calcium-bicarbonate
YP-T-6	West End Creek	45	8.4	179	120	43.1	<0.20	17.6	1.94	1.10	56.7	209	Calcium-magnesium-bicarbonate-sulfate
YP-T-1	Sugar Creek	46	7.7	54.2	56.1	16.5	<0.20	3.09	0.76	2.24	9.00	116	Calcium-magnesium-bicarbonate

Table Source: Data obtained from Midas Gold 2019

Table Notes:

$CaCO_3$ = calcium carbonate.

Units are milligrams per liter except for pH, which is in standard units.

Values in the table represent the average of sample results collected between 2012 and 2018.

Average concentrations for calcium, magnesium, potassium, and sodium represent the dissolved fraction.

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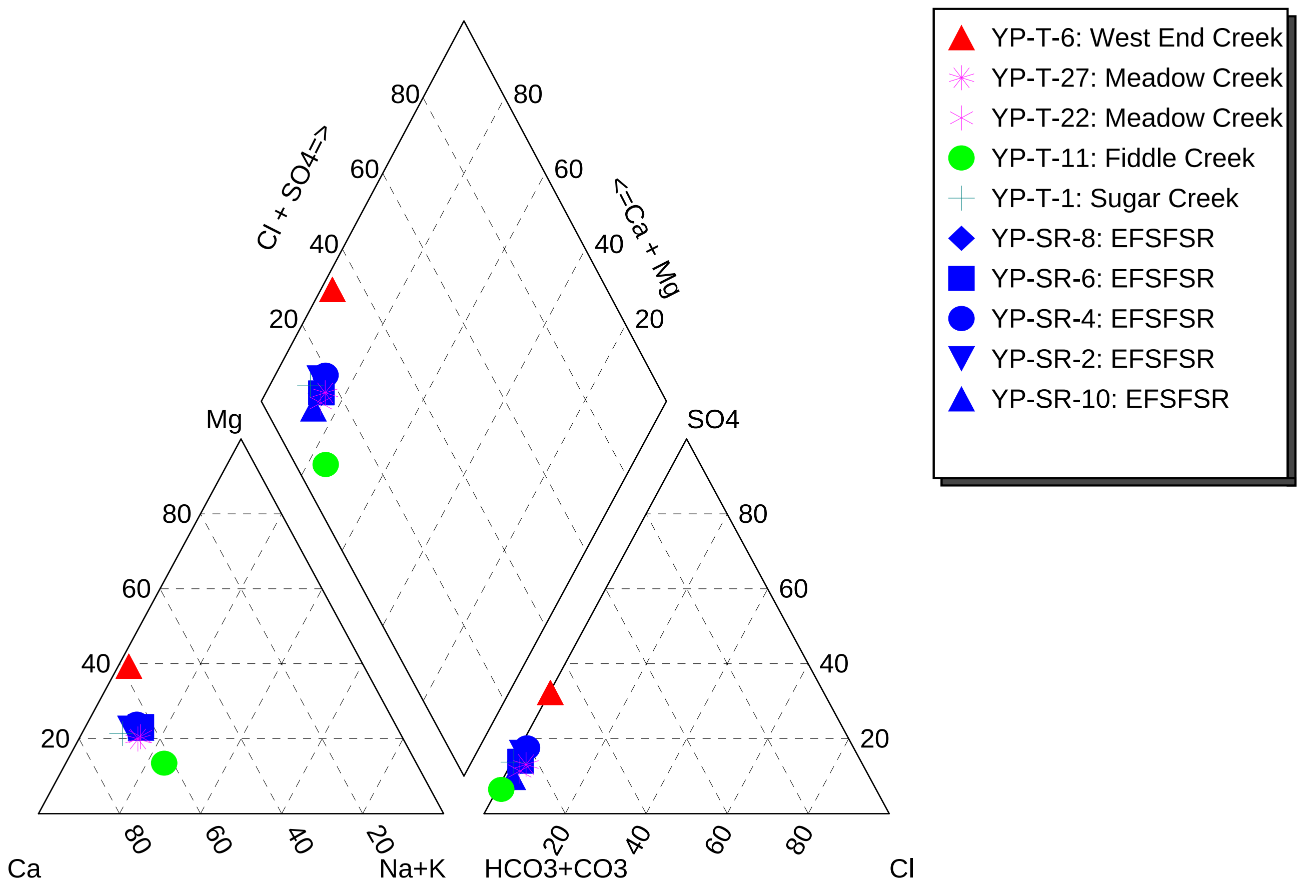

Figure Source: AECOM 2020

Figure 3.9-6 Tri-Linear Diagram of Average Major Ion Chemistry for Surface Water Assessment Nodes

West End Creek stands out as having the most notably different major ion signature among the surface water assessment nodes shown on the tri-linear plot. During the baseline period, West End Creek surface water exhibited a calcium-magnesium-bicarbonate-sulfate water type. With the exception of chloride and sodium, the West End Creek samples also had the highest major ion constituent concentrations among the surface water assessment nodes considered, with baseline sulfate and TDS concentrations averaging 57 and 209 mg/L, respectively. West End Creek sample point YP-T-6 is located downstream of both the upper and lower historical West End waste rock dumps; it is therefore possible that the water chemistry at this location has been influenced by the waste material, especially where the creek flows directly through the historical development rock piles. Mapped metamorphic bedrock in the West End valley (including marble, quartzite, and schist) also may affect the stream chemistry, as these rock types locally tend to produce higher TDS and alkalinity (SRK 2017).

Field-measured pH values for the surface water assessment nodes were generally in the range of 7 to 8 standard units. The highest average pH (8.4) was observed at West End Creek sample location YP-T-6. Elevated baseline pH measurements at this location are likely another indicator of the geochemical influence exerted by legacy waste rock material, natural mineralization, and the predominance of carbonate bedrock in the West End Creek drainage. Overall, the neutral to alkaline pH values observed in streams near the mine site show that the geochemistry of the natural mineralized deposits and the legacy mine materials is not conducive to widespread acid rock drainage.

3.9.3.1.1.2 Primary Constituents of Interest (Antimony, Arsenic, and Mercury)

The Surface Water Quality Baseline Study (HDR 2017) showed that most metals analyzed in mine site streams occur at concentrations that are below the strictest potentially applicable surface water quality standard. Exceptions include antimony, arsenic, and mercury. Naturally occurring mineralization and historical mining activity have resulted in surface water quality impairments for these constituents (Baldwin and Etheridge 2019). As such, recent surface water baseline studies conducted by both Midas Gold and USGS have attempted to characterize antimony, arsenic, and mercury concentrations in the Headwaters EFSFSR and Sugar Creek sub-watersheds.

Monitoring by Baldwin and Etheridge (2019) found that antimony in mine site streams primarily occurs in the dissolved phase with lower antimony concentrations recorded during high flow periods, suggesting a groundwater source. **Figure 3.9-7** illustrates the range in dissolved antimony concentrations for stream monitoring locations sampled during the Surface Water Quality Baseline Study (HDR 2017). Data for seeps in the Meadow Creek, EFSFSR, and Sugar Creek valleys also are provided on the figure for comparison. The stream and seep sample locations are organized from upstream (left) to downstream (right) on the horizontal axis of the figure. Overall, the figure depicts increasing dissolved antimony concentrations from upstream to downstream across the mine site.

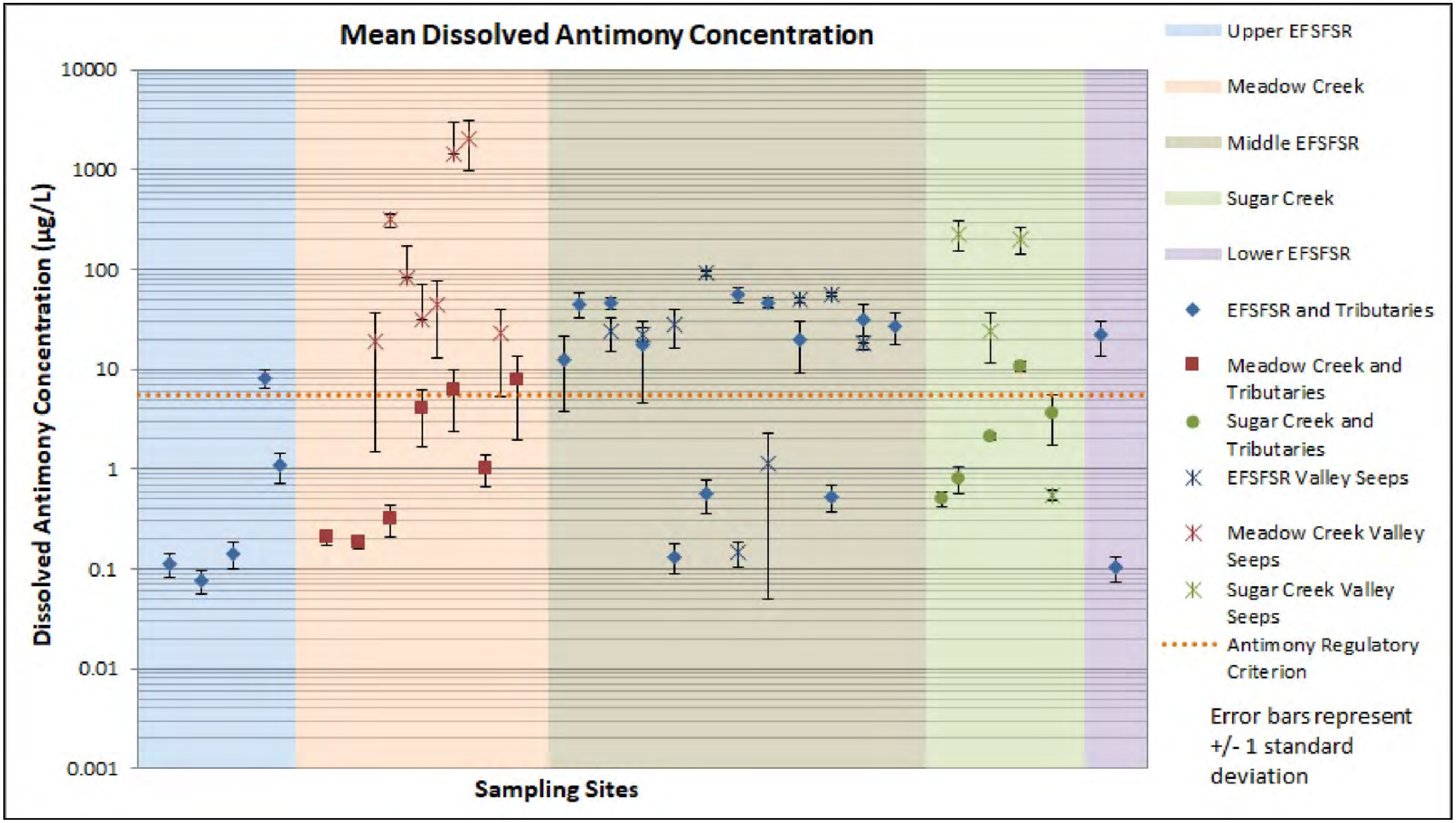

Figure Source: HDR 2017, Figure 4-11

Figure 3.9-7 Box and Whisker Plots for Average (2012 to 2016) Surface Water Dissolved Antimony Concentrations, Organized from Upstream (Left) to Downstream (Right) Across the Mine Site

As shown on **Figure 3.9-7**, average dissolved antimony concentrations are generally below the strictest potentially applicable surface water quality standard in the upper EFSFSR drainage. In the Meadow Creek drainage, dissolved antimony concentrations are higher, possibly due to loading from seeps associated with historical mining materials and/or the presence of natural mineralization in adjacent bedrock. The seeps in Meadow Creek valley had the highest concentrations of dissolved antimony across the site. Below the confluence with Meadow Creek, both the stream and seep sample locations in the middle EFSFSR drainage generally exhibited dissolved antimony concentrations above the strictest potentially applicable surface water quality standard from **Table 3.9-2**. Exceptions included tributary sample locations associated with Fiddle Creek (YP-T-11 and YP-T-12) and Hennessy Creek (YP-T-41). In the Sugar Creek valley, which flows across historically mined areas and natural mineralization, seep samples typically contained dissolved antimony above the strictest potentially applicable water quality standard, but the surface water dissolved antimony concentrations tended to be lower due to dilution of the seep inputs. Below the confluence with Sugar Creek, the average dissolved antimony concentration in the EFSFSR at monitoring location YP-SR-2 was found to be 21.9 micrograms per liter (µg/L), which is above the strictest potentially applicable surface water quality standard. This concentration is within the range of average antimony values documented at upstream EFSFSR assessment nodes YP-SR-4, YP-SR-6, YP-SR-8, and YP-SR-10 (**Table 3.9-5**).

Up to 96 percent of arsenic in the mine site drainages occurs in the dissolved phase, suggesting a groundwater source similar to antimony (Baldwin and Etheridge 2019). **Figure 3.9-8** illustrates the trend in dissolved arsenic concentrations for stream and seep monitoring locations sampled during the Surface Water Quality Baseline Study (HDR 2017). Overall, the dissolved arsenic concentration data exhibit an increasing concentration trend from upstream to downstream across the mine site.

As shown on **Figure 3.9-8**, average dissolved arsenic concentrations are generally below the strictest potentially applicable surface water quality standard in the upper EFSFSR drainage. In the Meadow Creek drainage, dissolved arsenic concentrations increase where Meadow Creek flows past the SODA and former smelter site, presumably due to inputs from seeps and groundwater influenced by historical mining materials. The seeps in Meadow Creek valley had the highest concentrations of dissolved arsenic across the site. Below the confluence with Meadow Creek, both the stream and seep sample locations in the middle EFSFSR drainage generally exhibited dissolved arsenic concentrations above the strictest potentially applicable surface water quality standard. Exceptions included tributary sample locations associated with Fiddle Creek (YP-T-11) and Hennessy Creek (YP-T-41), both of which drain less mineralized areas. In the Sugar Creek valley, the seep samples typically contained dissolved arsenic above the strictest potentially applicable surface water quality standard, but the surface water dissolved arsenic concentrations tended to be lower. Below the confluence with Sugar Creek, the average dissolved arsenic concentration in the EFSFSR at monitoring location YP-SR-2 was found to be 44.5 µg/L, which is above the strictest potentially applicable surface water quality standard.

Based on data from the 10 surface water assessment nodes (**Table 3.9-4**), the average dissolved mercury concentration measured during the baseline study was calculated to range from 4 to 56 percent of the average total mercury concentration (HDR 2017). This finding illustrates that, in contrast to antimony and arsenic, mercury primarily occurs in the particulate phase. The association with particles indicates that mercury is derived from erosion and/or resuspension of surface material, rather than groundwater (Baldwin and Etheridge 2019).

The mean total mercury concentrations for streams and seeps across the mine site are presented on **Figure 3.9-9**. The figure shows that average total mercury concentrations were generally below the water quality standard at most of the surface water sampling locations. However, many of the seep sample locations in the Meadow Creek, Middle EFSFSR, and Sugar Creek drainages exceeded the regulatory criterion. In contrast, a similar plot for dissolved mercury (**Figure 3.9-10**) shows that the mean dissolved mercury concentration is below the Idaho surface water quality standard for total recoverable mercury at the majority of locations sampled, further supporting the notion that much of the mercury in the mine site area is associated with particulates.

The surface water assessment nodes YP-SR-10 (EFSFSR below Meadow Creek), YP-SR-4 (EFSFSR below YPP), and YP-T-1 (Sugar Creek above EFSFSR) closely correspond to sample locations EF2, EF3, and Sugar Creek monitored by the USGS (Baldwin and Etheridge 2019). A side-by-side comparison of average dissolved antimony, dissolved arsenic, and dissolved and total mercury concentrations for these sites is presented in **Table 3.9-4**. Data used to calculate the averages shown in the table were collected between 2011 and 2017 for the USGS locations and 2012 to 2018 for the Midas Gold sample points. Overall, the average dissolved antimony and arsenic concentrations from the two studies are in good agreement, with relative percent difference values between the means of 1.8 to 11.3 percent. Greater variability is evident between the dissolved and total mercury sample averages. The variability in mercury results may be attributable to the generally low concentration values, differing amounts of particulate matter in the total mercury samples, laboratory protocol differences between the two studies, or different runoff conditions in the non-overlapping years sampled (2011 and 2018).

Temporal variations in antimony, arsenic, and mercury concentrations can be correlated to daily mean stream flow (Baldwin and Etheridge 2019). A representative trend plot is provided on **Figure 3.9-11** for downstream sampling location YP-SR-4 on the EFSFSR below Yellow Pine pit. The figure shows that total and dissolved antimony and arsenic concentrations are inversely correlated to streamflow and tend to be higher during low flow conditions. These findings indicate that groundwater inflows are likely the main source contributing to surface water antimony and arsenic concentrations at the mine site. The highest concentrations of arsenic are consistently observed during the July to March low flow period. For antimony, the highest concentrations occur near the end of the low flow period as streamflow is beginning to rise during the first flush of spring snowmelt. This first flush phenomenon has been observed at other mine sites and is attributable to the dissolution of soluble salts and the flushing of water concentrated by evaporation (Nordstrom 2009).

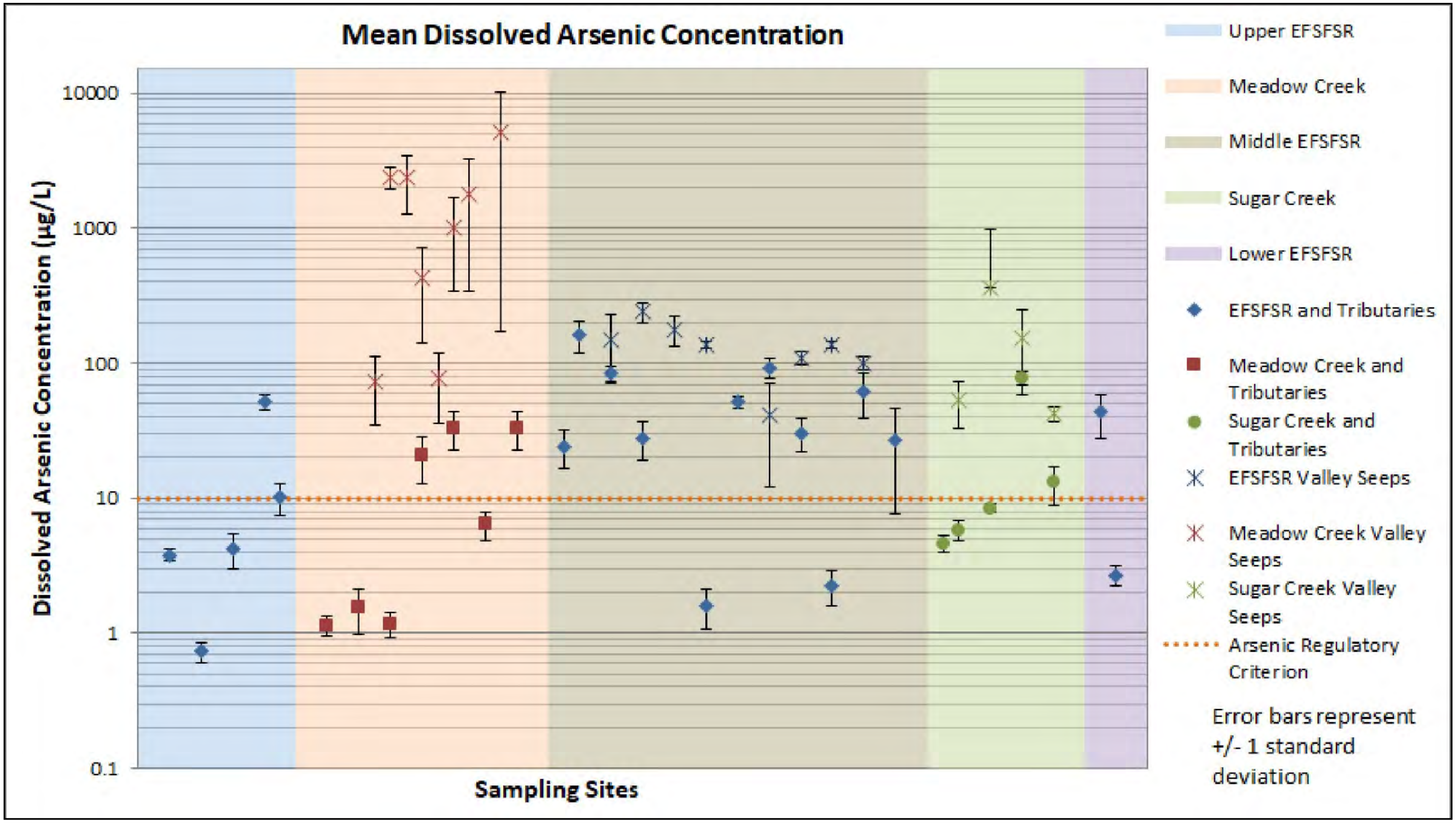

Figure Source: HDR 2017, Figure 4-13

Figure 3.9-8 Box and Whisker Plots for Average (2012 to 2016) Surface Water Dissolved Arsenic Concentrations, Organized from Upstream (Left) to Downstream (Right) Across the Mine Site

Table 3.9-4 Comparison of Average Baseline Concentrations between Midas Gold and USGS Sample Locations

Sample Location	YP-SR-10	EF2	% Difference	YP-SR-4	EF3	% Difference	YP-T-1	Sugar Creek	% Difference
Data Source	Midas Gold	USGS	---	Midas Gold	USGS	---	Midas Gold	USGS	---
No. Samples	45	28 - 40	---	45	31 - 39	---	46	35 - 38	---
Antimony, diss	12.2	10.9	11.3	31.0	27.9	10.5	3.41	3.35	1.8
Arsenic, diss	24.6	23.7	3.7	63.0	56.5	10.9	13.0	12.1	7.2
Mercury, diss	0.003	0.004	46.2	0.002	0.004	50.0	0.007	0.014	61.7
Mercury, total	0.006	0.017	95.7	0.006	0.008	28.6	0.159	1.19	152.9

Table Source: Baldwin and Etheridge 2019; Midas Gold 2019

Table Notes:

USGS = United States Geological Survey.

Concentration units are in micrograms per liter.

Values in the table represent the average of sample results collected between 2012 and 2018 for Midas Gold samples, and between 2011 and 2017 for USGS samples.

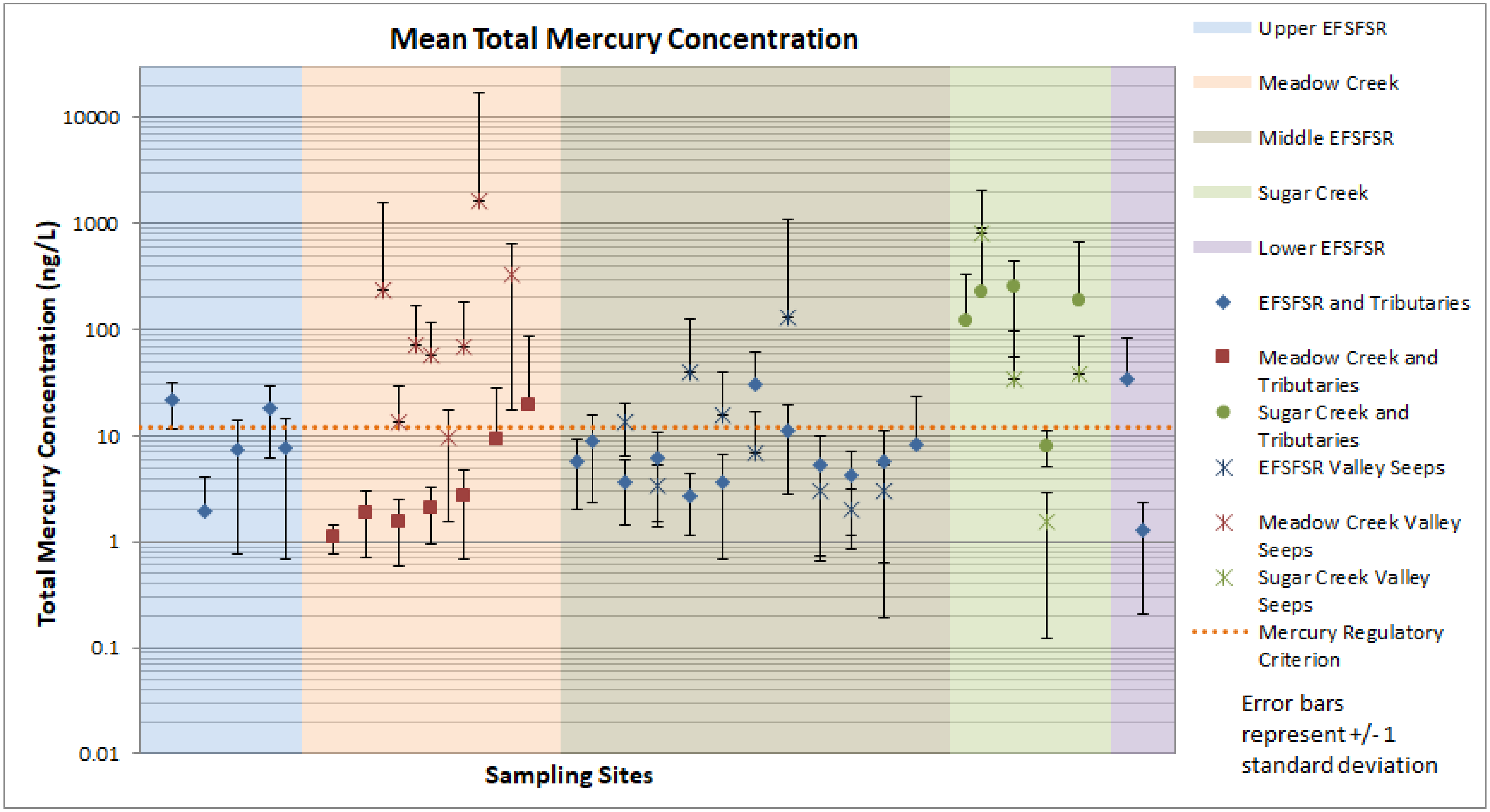

Figure Source: HDR 2017, Figure 4-14

Figure 3.9-9 Box and Whisker Plots for Average (2012 to 2016) Surface Water Total Mercury Concentrations, Organized from Upstream (Left) to Downstream (Right) Across the Mine Site

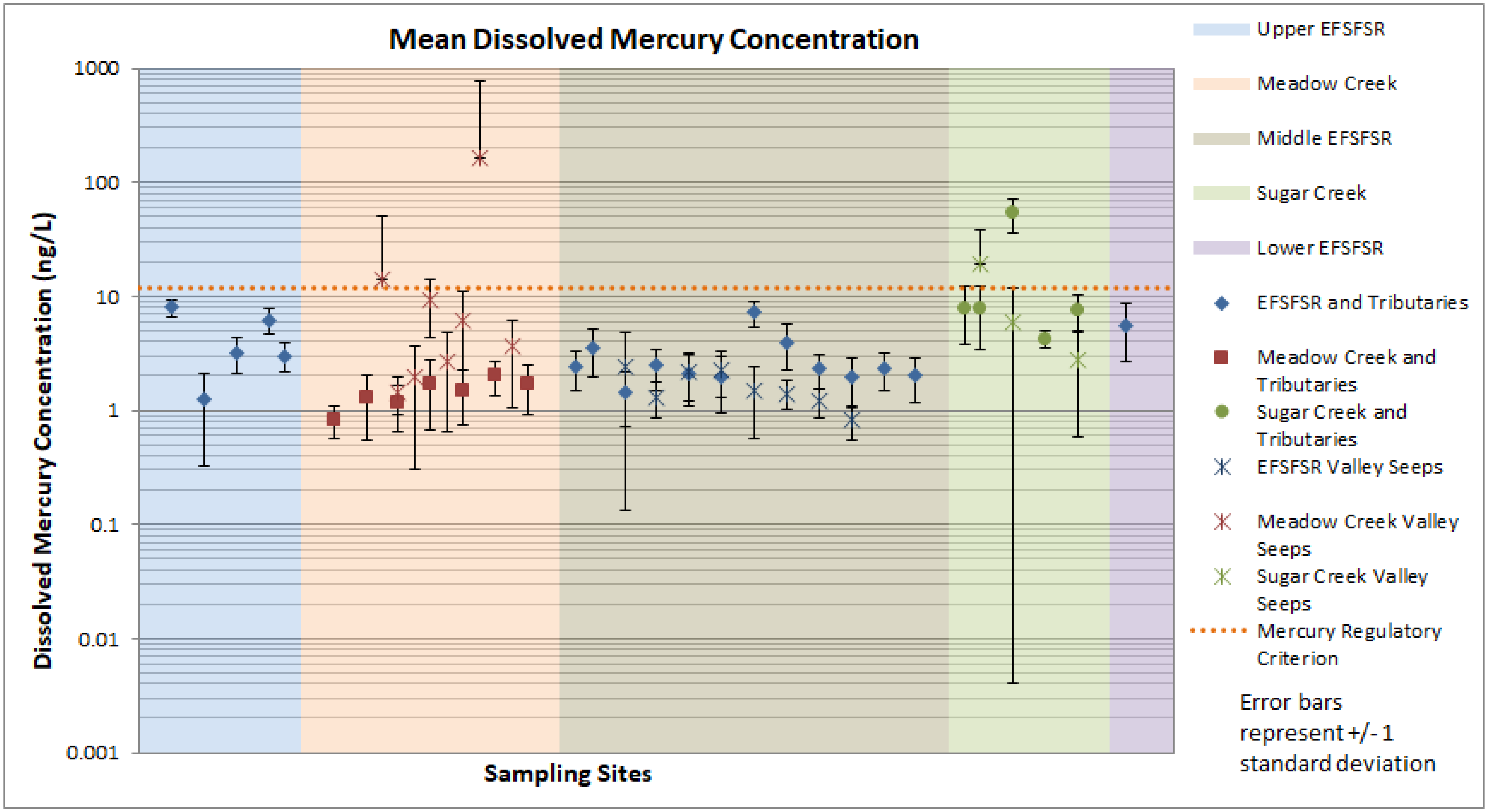

Figure Source: HDR 2017, Figure 4-15

Figure Notes:

The surface water quality standard used for comparison on the figure is for total recoverable mercury.

Figure 3.9-10 Box and Whisker Plots for Average (2012 to 2016) Surface Water Dissolved Mercury Concentrations, Organized from Upstream (Left) to Downstream (Right) Across the Mine Site

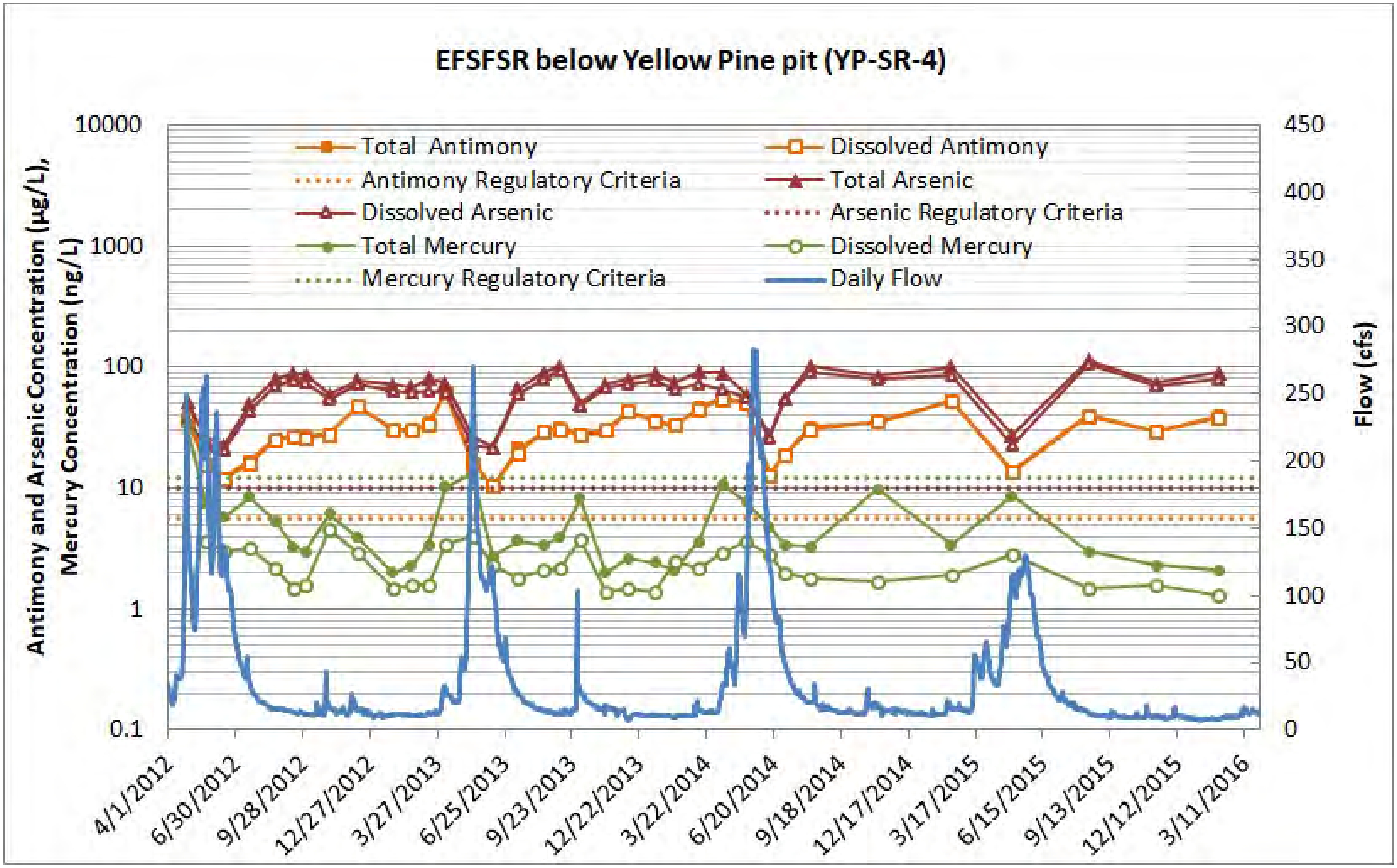

Figure Source: HDR 2017, Figure 4-22

Figure 3.9-11 Comparison of Average Daily Flow Rates and Constituent of Interest Concentrations at YP-SR-4 – April 2012 through February 2016

Conversely, mercury concentrations are positively correlated to streamflow, with the highest total mercury concentrations occurring during high flow conditions. This relationship indicates that mercury is derived from erosion and resuspension of surface material (Baldwin and Etheridge 2019).

3.9.3.1.1.3 Secondary Constituents of Interest

Other constituents that occur in mine development rock or may be used in ore processing include aluminum, cadmium, copper, total cyanide, iron, lead, manganese, selenium, thallium, and zinc. Baseline concentrations of these constituents measured at the 10 surface water assessment nodes are provided in **Table 3.9-5**. The table also includes the minimum and maximum concentrations measured for each constituent to illustrate the range of values reported during the baseline study.

3.9.3.1.1.4 Methylmercury

Methylmercury (MeHg) also was sampled by HDR as part of the Surface Water Quality Baseline Study (HDR 2017), with additional sampling performed in 2017 and 2018 (Midas Gold 2019). Sample results for the 10 surface water assessment nodes are provided in **Table 3.9-6**. Each assessment node was sampled for MeHg 26 to 27 times between 2012 and 2018, with approximately 90 percent of the sample results reported below the method detection limit (<0.1 nanograms per liter [ng/L]). The range of observed MeHg values varied between a minimum of <0.1 ng/L (all sites) to a maximum of 0.64 ng/L (Sugar Creek). Mean MeHg values (calculated using the method detection limit for non-detect results) were at or just above the 0.1 ng/L detection limit.

To provide context for the mine site MeHg values, the baseline concentration ranges in **Table 3.9-6** were compared to summary statistics from a USGS study of MeHg in U.S. streams (USGS 2009). In this study, the USGS found no statistical difference in surface water MeHg concentrations between previously mined and unmined stream basins. Stream MeHg concentrations across all sites sampled during the study were found to range from <0.010 ng/L to 4.11 ng/L, with a mean concentration of 0.19 ng/L. In most cases, the maximum MeHg concentrations observed in the mine site assessment nodes were less than this nationwide average. Exceptions include the EFSFSR at YP-SR-6 (maximum concentration of 0.20 ng/L), Fiddle Creek (maximum concentration of 0.35 ng/L), and Sugar Creek (maximum concentration of 0.64 ng/L). However, even at Sugar Creek, which has a well-documented upstream source of mercury from the former Cinnabar Mine, MeHg was not detected in 67 percent of the samples collected. The range of results from the Surface Water Quality Baseline Study (HDR 2017) and subsequent sampling suggests that MeHg concentrations in mine site streams are not appreciably different from those reported by the USGS nationwide study, and that historical mining activity in the analysis area has not increased MeHg concentrations above those observed at similar reference locations throughout the U.S.

This finding is important because MeHg is present at elevated concentrations in several mine site seeps, as summarized in **Table 3.9-7**. The calculated means for the seep samples range from <0.1 ng/L at YP-S-3 to 0.93 ng/L at YP-S-5. Maximum MeHg values for the seeps also tend to be higher, reaching 6.6 ng/L at the Smelter Flats Seep (YP-S-5). Despite these relatively high concentrations, the mine site seeps do not appear to significantly influence surface water MeHg levels, either due to the low seep flow rates or localized degradation of MeHg around the seeps.

3.9.3.1.1.5 Temperature

Stream temperature criteria have been established for chinook salmon, steelhead, and bull trout in the Payette National Forest Land and Resource Management Plan as amended (Forest Service 2003). IDEQ also has published thermal criteria for salmonid species that vary based on the aquatic life classification of a water body (e.g., warm water aquatic life, cold water aquatic life, salmonid spawning, etc.) (IDEQ 2019). The IDEQ standards include requirements for Maximum Daily Maximum Temperature, Maximum Weekly Maximum Temperature, and Maximum Daily Average Temperature. These standards have been promulgated to protect aquatic life uses, and are tabulated and discussed further in Section 3.12, Fish Resources and Fish Habitat.

Establishing existing surface water temperature conditions at the mine site was important to provide a baseline dataset for comparing future temperature changes caused by the action alternatives. Two methods for establishing baseline temperatures were used: monthly grab samples and 15-minute temperature measurements. Temperature ranges from both datasets are discussed below; however, the 15-minute temperature measurements are believed to provide a more accurate representation of diurnal temperature variability for comparison to thermal criteria.

A summary of monthly grab sampling temperature statistics is provided in **Table 3.9-8** for the surface water assessment nodes. The data and statistics shown in the table were compiled from the Surface Water Quality Baseline Study (HDR 2017). A review of the monthly temperature statistics indicates that summer monthly stream temperatures are typically highest in July and August, with July temperatures ranging from a low of 6.8 degrees Celsius (approximately 44 degrees Fahrenheit) at YP-T-6 to a high of 17.8 degrees Celsius (approximately 64 degrees Fahrenheit) at YP-SR-6. Average monthly fall temperatures are highest in September, ranging from 6.7 degrees Celsius (approximately 44 degrees Fahrenheit) at YP-T-6 to 12.7 degrees Celsius (approximately 55 degrees Fahrenheit) at YP-T-22.

For comparison to the monthly statistics, a graphical depiction of 15-minute temperature measurements is provided for the two-week periods centered on August 1 (**Figure 3.9-12**) and September 21 (**Figure 3.9-13**). These dates approximately coincide with the average timing of maximum summer and fall stream temperatures in the mine site area.

Table 3.9-5 Average, Minimum, and Maximum Measured Constituent Concentrations for Surface Water Assessment Nodes

Sampling Point	Stream	Aluminum (µg/L)			Ammonia, as Nitrogen (mg/L)			Antimony (µg/L)			Arsenic (µg/L)			Cadmium (µg/L)	Copper (µg/L)			Cyanide, Total (mg/L)	Iron (µg/L)			Lead (µg/L)	Manganese (µg/L)			Mercury, Total (ng/L)			Mercury, Dissolved (ng/L)			Nitrate+Nitrite as Nitrogen (mg/l)			Selenium (µg/L)	Thallium (µg/L)	Zinc (µg/L)		
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Range	Avg	Min	Max	Range	Avg	Min	Max	Range	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Range	Range	Avg	Min	Max
YP-T-27	Meadow Creek	12.0	4.2	25.3	NC	<0.05	0.053	6.10	2.04	16.9	34.8	11.8	60.7	<0.02	0.3	0.1	0.7	<0.0027 - 0.0104	63.3	<20	124	<0.04	25.6	4.5	42.7	2.5	<1	11.8	1.5	<0.6	3.8	NC	<0.05	0.091	< 1	<0.04	1.7	<0.5	3.0
YP-T-22	Meadow Creek	12.2	3.6	57.7	NC	<0.05	0.062	8.12	2.4	35.8	34.4	13.6	56.8	<0.02	0.3	0.1	1	<0.0027	69.9	21	149	<0.02 - 0.04	23.4	5.7	39.0	15.6	1.3	404	1.7	<0.7	4	NC	<0.05	0.095	<1	<0.04	1.7	<0.5	3.3
YP-SR-10	EFSFSR	9.4	3.0	32.2	NC	<0.05	0.084	12.2	3.93	47.1	24.6	8.6	41.4	<0.02	0.2	<0.1	0.5	<0.0027	39.7	<20	84	<0.04 - 0.06	13.1	3.1	21	6.1	2.0	31.5	2.5	<1	5.7	NC	<0.05	0.063	<1	<0.04	1.4	<0.5	2.5
YP-SR-8	EFSFSR	9.4	3.1	25.6	NC	<0.05	0.065	16.9	5.7	61.8	28.1	12.3	48.7	<0.02 - 0.27	0.3	0.1	2.6	<0.0027 - 0.0104	34.5	<20	59	<0.03 - 0.06	11.3	3.6	18.9	6.0	1.6	20.1	2.4	<0.5	5	NC	<0.05	0.080	<1	<0.02 - 0.04	1.5	<0.5	4.1
YP-SR-6	EFSFSR	9.8	2.6	41	NC	<0.05	<0.05	19.3	6.37	46.9	30.6	12.6	41.4	<0.02	0.2	0.1	0.5	<0.0027	35.4	22	54	<0.02 - 0.04	8.5	3.5	15.4	5.6	1.9	24.7	2.4	1.4	4.7	NC	<0.05	0.066	<1	<0.04	1.6	<0.5	3.0
YP-SR-4	EFSFSR	11.9	2.5	33.9	NC	<0.05	0.191	31.0	10.4	62.0	63.0	20.8	105	<0.02	0.3	0.1	0.6	<0.0027	65.3	24	187	<0.02 - 0.04	20.4	5.7	50.6	5.9	<0.5	32.7	2.4	1.3	4.5	NC	<0.05	0.061	<1	<0.02 - 0.04	1.4	<0.5	2.4
YP-SR-2	EFSFSR	14.0	2.2	111	NC	<0.05	0.09	21.9	6.79	38.2	44.5	14.7	71.1	<0.02 - 0.03	0.2	0.1	0.6	<0.0027	40.5	<21	160	<0.02 - 0.04	11.1	3.4	25.8	41.3	3.1	395	5.7	1.7	29.5	NC	<0.05	0.114	<1	<0.02 - 0.04	1.3	<0.5	3.0
YP-T-11	Fiddle Creek	15.7	4.4	45.6	NC	<0.05	<0.05	0.56	0.23	1.09	1.6	0.5	2.9	<0.02	0.2	<0.1	0.6	<0.0027 - 0.0128	22.3	<14	40.2	<0.02 - 0.03	1.1	<1.1	1.6	3.3	<1.0	13.9	1.8	<0.1	4.2	NC	<0.05	0.082	<1	<0.04	1.6	<0.5	2.0
YP-T-6	West End Creek	4.0	3.0	6.3	NC	<0.05	<0.05	10.5	5.72	13.0	79.6	45	97.3	<0.02	0.3	<0.1	0.9	<0.0027	NC	<21	<21	<0.02 - 0.06	NC	<1.1	<1.1	7.8	5.1	18.1	4.2	3.0	8.9	0.448	0.147	0.770	<1	<0.04	1.6	<0.6	2.5
YP-T-1	Sugar Creek	9.0	2.0	80.2	NC	<0.05	<0.05	3.41	1.25	8.64	13.0	6.5	22.4	<0.02 - 0.32	8.5	0.1	342	<0.0027	21.4	<21	39	<0.02 - 19.3	1.3	<1.1	4	159	9.6	2380	7.4	1.6	14.2	NC	<0.05	0.061	<1	<0.02 - 0.04	6.8	<0.6	234

Table Source: Data obtained from Midas Gold 2019

Table Notes:

µg/L = micrograms per liter; mg/L = milligrams per liter; ng/L = nanograms per liter.

Avg/Min/Max = sample average, minimum, and maximum.

NC = average value not calculated due to the high percentage of non-detect results.

Values represent the dissolved fraction unless otherwise noted.

Values in the table represent the average of sample results collected between 2012 and 2018. A range of values is provided for sample populations where most results were non-detect.

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Table 3.9-6 Baseline Methylmercury Concentrations for Surface Water Assessment/Prediction Nodes

Sampling Point	Stream	No. Samples	Percent Non-Detects	Average MeHg (ng/L)	Min MeHg (ng/L)	Max MeHg (ng/L)
YP-T-27	Meadow Creek	26	96	<0.1	<0.1	0.13
YP-T-22	Meadow Creek	26	89	0.11	<0.1	0.18
YP-SR-10	EFSFSR	26	89	<0.1	<0.1	0.17
YP-SR-8	EFSFSR	26	100	<0.1	<0.1	<0.1
YP-SR-6	EFSFSR	26	92	<0.1	<0.1	0.20
YP-SR-4	EFSFSR	26	96	<0.1	<0.1	0.11
YP-SR-2	EFSFSR	26	81	<0.1	<0.1	0.15
YP-T-11	Fiddle Creek	26	89	0.11	<0.1	0.35
YP-T-6	West End Creek	27	96	<0.1	<0.1	<0.1
YP-T-1	Sugar Creek	27	67	0.14	<0.1	0.64

Table Source: Data obtained from Midas Gold 2019

Table Notes:

MeHg = methylmercury.

ng/L = nanograms per liter.

Min = sample minimum.

Max = sample maximum.

Values in the table were compiled from sample results collected between 2012 and 2018.

Table 3.9-7 Methylmercury Concentrations at Seep Sampling Locations

Seep Location	Description	No. Samples	Percent Non-Detects	Mean MeHg (ng/L)	Max MeHg (ng/L)	MeHg Standard Deviation (ng/L)
YP-S-2	Fault seep above workings	7	14	0.18	0.35	0.09
YP-S-3	Garnet Pit Seep	20	85	<0.1	0.1	0.01
YP-S-5	Smelter Flats Seep	8	75	0.93	6.6	2.29
YP-S-6	Adjacent to Keyway Marsh	20	30	0.30	1.0	0.23
YP-S-7	East side of SODA berm, adjacent to large marsh east of SODA on Hangar Flats	23	57	0.16	0.6	0.13
YP-S-8	East side of SODA berm, adjacent to large marsh east of SODA on Hangar Flats	24	88	0.35	5.9	1.18
YP-S-10	Keyway Marsh outlet	25	80	0.11	0.2	0.03
YP-AS-7	The Meadow Creek Mine adit seep	15	33	0.32	1.6	0.41
YP-T-23a	Heap leach seep southwest corner of the heap leach pile on Hangar Flats	13	85	0.12	0.3	0.06

Table Source: Midas Gold 2019

Table Notes:

ng/L = nanograms per liter.

MeHg = methylmercury.

SODA = spent heap leach ore disposal area.

Table 3.9-8 Summary of Average, Minimum, and Maximum Monthly Water Temperatures for the Surface Water Assessment Nodes

Assessment Node	Temperature (ºC)																													
	YP-T-27 (n=35)			YP-T-22 (n=35)			YP-SR-10 (n=35)			YP-SR-8 (n=35)			YP-T-11 (n=35)			YP-SR-6 (n=35)			YP-T-6 (n=34)			YP-T-1 (n=35)			YP-SR-4 (n=35)			YP-SR-2 (n=35)		
Month	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max
January	-	0.45	-	-	0.35	-	-	0.8	-	-	1.1	-	-	0.45	-	-	1.05	-	-	1.85	-	-	0.45	-	-	0.95	-	-	0.75	-
February	0.1	0.425	1.1	0	0.825	2.8	0.1	0.25	0.5	0	0.475	1.3	0	0.4	0.9	0	0.375	0.6	2.1	2.775	3.2	0.2	0.875	1.8	0.3	0.7	1.6	0.1	0.475	1.2
March	-	0.25	-	-	1.4	-	-	2.15	-	-	1.95	-	-	0.75	-	-	0.25	-	-	2.7	-	-	1.15	-	-	1.9	-	-	1.6	-
April	1.5	1.567	1.7	1.9	2.467	2.9	1.1	2.967	5.2	0.5	2.767	4.7	1.9	1.933	2	2.2	2.533	2.7	-	2.75	-	2.5	3.367	4.3	2.8	3	3.2	3.3	3.833	4.3
May	4	5.525	6.4	4.7	6.7	7.5	2.8	4.125	6.7	3.2	5.775	10.3	2.4	3.25	4.3	3.9	4.95	6.3	4.9	5.175	5.8	4.8	6.225	8.6	4.5	4.8	5.2	5.1	6.15	6.8
June	6.2	7.767	9	6.5	7.4	9	7.2	8.2	9	7.5	8.833	10.7	4.1	6.667	9.4	4.8	8	11.7	5.4	7.033	7.9	5.5	8.7	10.6	5.5	7.933	10.3	5.4	8.933	11.2
July	10	12.37	14.5	13.5	15.6	16.8	8	11.53	13.7	8.6	12.87	16.2	9.2	10.53	11.9	8	11.87	17.8	6.8	8.367	10.2	11.1	13.1	14.6	12.7	15.03	16.8	10.8	13.63	17.4
August	9.2	13.45	16.4	13.3	16.27	17.4	9.5	12.88	15.8	7	8.325	10.2	8	9.75	11	7.9	9.4	12.5	6.7	7.425	7.8	11.3	12.52	13.8	12.5	13.58	14.5	11.5	13.58	15.1
September	-	10.3	-	-	12.65	-	-	12	-	-	10.8	-	-	9.05	-	-	7.8	-	-	6.65	-	-	8.9	-	-	11.1	-	-	11.4	-
October	-	6.1	-	-	7.8	-	-	3.8	-	-	3.15	-	-	3.6	-	-	4.05	-	-	3.75	-	-	2.4	-	-	7	-	-	6.6	-
November	0	1.925	4.7	0	2.575	4.6	0.1	1.8	4.3	0	1.975	4.6	0	2.075	4.4	0.6	1.825	3.8	3	4.15	5	0.3	2.4	3.9	0.8	2.55	4.2	1	2.725	4.1
December	-	0.7	-	-	0.05	-	-	0.4	-	-	0.25	-	-	0.8	-	-	0.15	-	-	1.45	-	-	0.1	-	-	0.35	-	-	0.1	-

Table Source: HDR 2017

Table Notes:

Where sample number is < 3, only average values are reported.

- = No monitoring data available.

°C = degrees Celsius.

Min = minimum.

Max = maximum.

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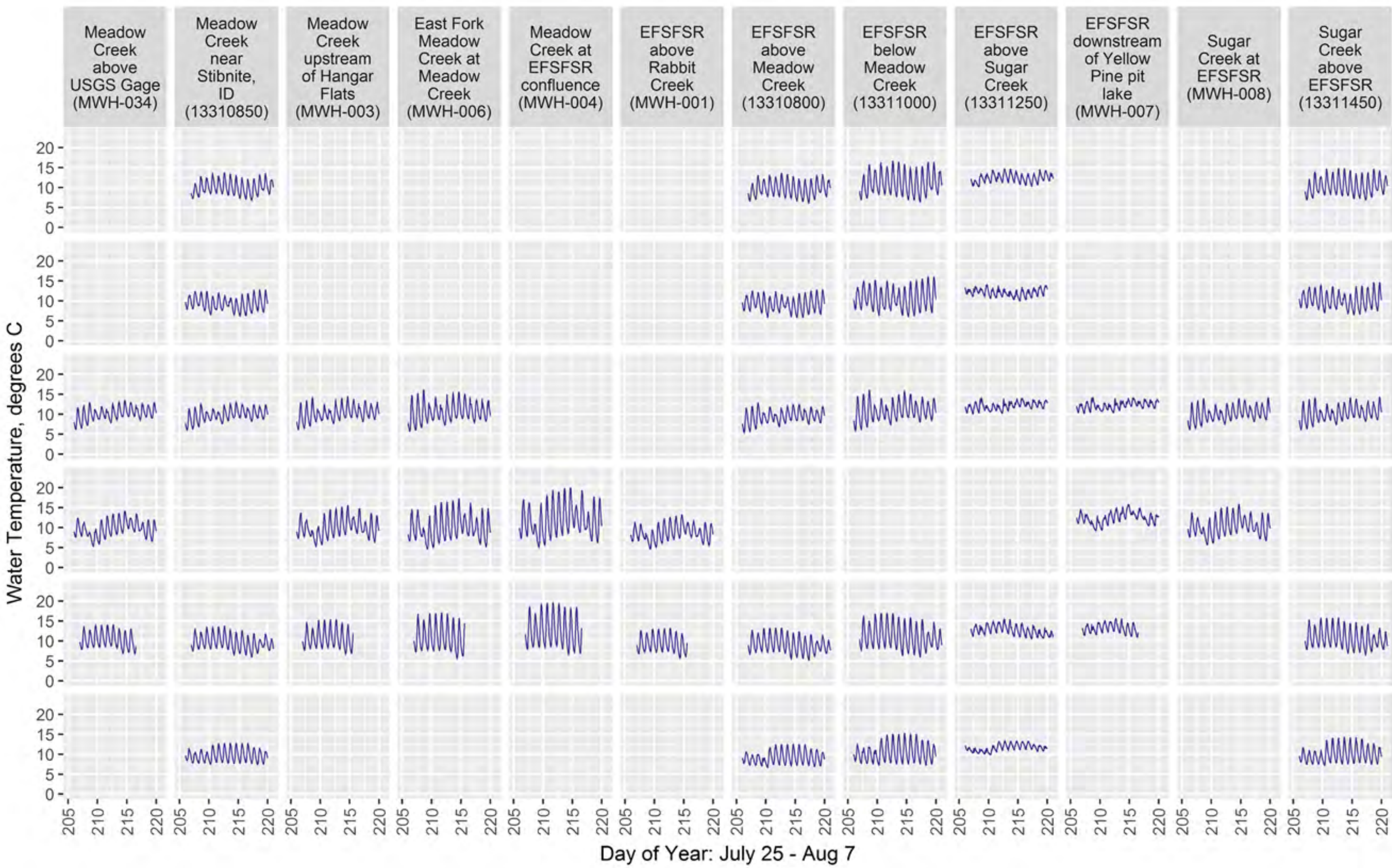

Figure Source: Brown and Caldwell 2018b

Figure 3.9-12 15-Minute Temperature Data (Centered on August 1) Measured by USGS and MWH in the Study Area

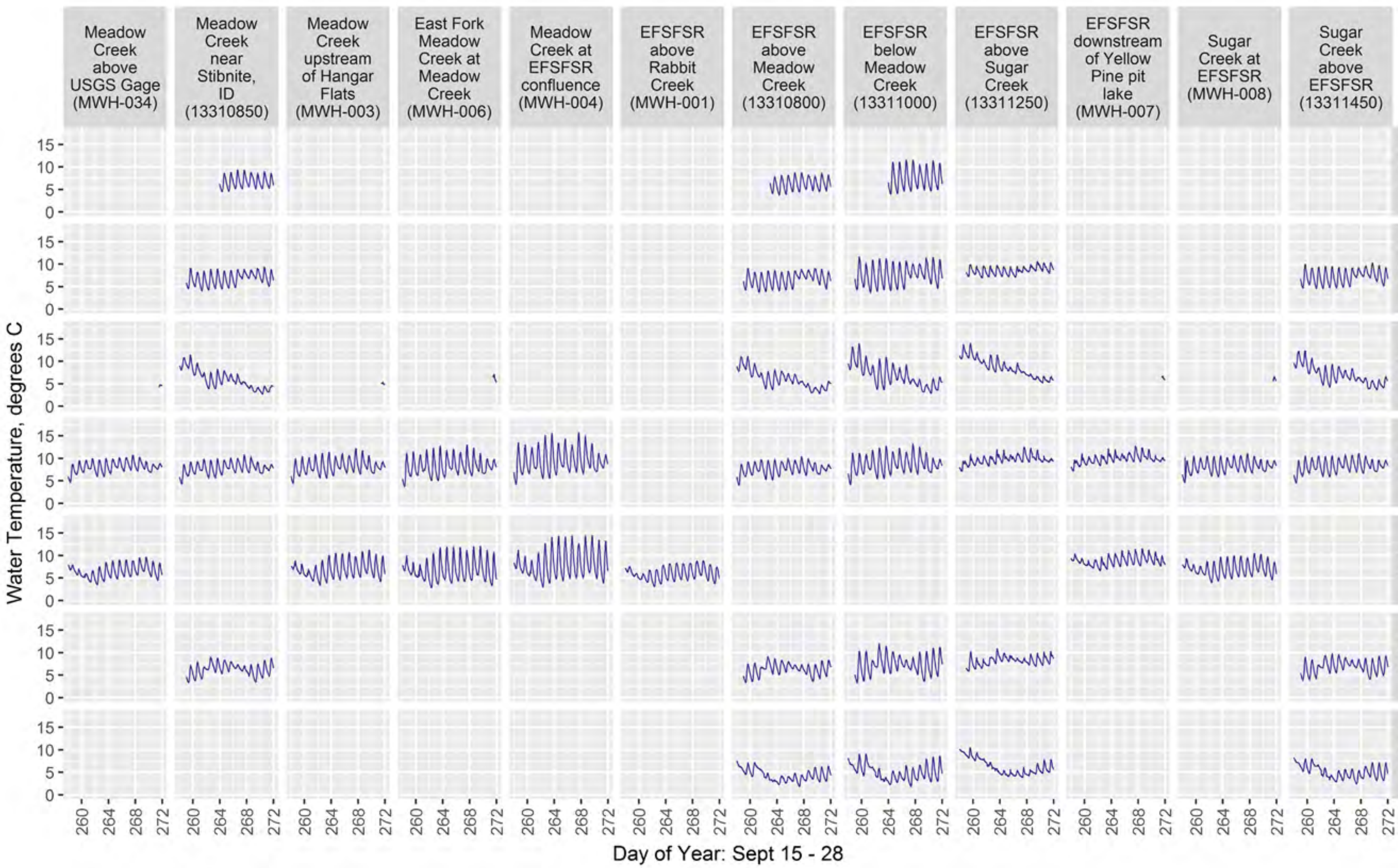

Figure Source: Brown and Caldwell 2018b

Figure 3.9-13 15-Minute Temperature Data (Centered on September 21) Measured by USGS and MWH in the Study Area

The 15-minute temperature data used in the water quality evaluation spans a period of record extending from 2012 through 2017. During this timeframe, 2016 was found to be the year with the warmest summer stream temperatures (**Figure 3.9-12**). The maximum summer temperatures in 2016 occurred on July 29, slightly before the average date of August 1. Observed conditions during the weekly periods immediately before and after July 29, 2016, therefore represent the period of low-flow, maximum weekly summer temperatures. The range of observed temperatures across the mine site during this two-week period in 2016 was 7.2 to 19.6 degrees Celsius (approximately 45 to 67 degrees Fahrenheit) (Brown and Caldwell 2018b).

During the fall period, maximum stream temperatures were observed two years earlier in 2014 (**Figure 3.9-13**). The maximum daily fall temperature in 2014 occurred on September 24, slightly after the average date of September 21. Observed conditions during the weekly period immediately before and after September 24, 2014, therefore represent the period of low-flow, maximum weekly fall temperatures. The range of observed temperatures during this fall period was 6.6 to 15.7 degrees Celsius (approximately 44 to 60 degrees Fahrenheit) (Brown and Caldwell 2018b). Overall, these weekly summer and fall values offer a better representation of the low flow, maximum seasonal temperatures than the monthly data, and therefore provide a better baseline for comparison to thermal criteria and future predicted temperature increases.

3.9.3.1.1.6 Sediment Content

Wildfires have burned much of the forested area at the mine site and vicinity, resulting in erosion from the burned areas. In addition, the failure of a water dam on East Fork Meadow Creek in 1965 caused extensive erosion both upstream and downstream of the former dam, with deposition of eroded sediment in Meadow Creek and transport of sediment into the EFSFSR continuing to occur.

The ongoing erosion and sediment transport affect the turbidity and TSS content of surface water. The dynamics and relationships between turbidity and TSS are functions of watershed-specific factors; but in general, the more TSS in the water, the murkier it seems and the higher the turbidity. **Table 3.9-9** and **Table 3.9-10** provide the TSS (in mg/L) and turbidity (in Nephelometric Turbidity Units), respectively, for the 10 surface water assessment nodes. As shown in the tables, while concentrations of TSS and turbidity are typically low during some months under existing conditions, seasonal variations occur, and concentrations reach moderate to high levels during high flow periods.

An overview of sediment transport at the mine site also is provided in Etheridge (2015). This study found that much of the sediment entering the EFSFSR was derived from Sugar Creek, Meadow Creek, and East Fork Meadow Creek (i.e., Blowout Creek). The Meadow Creek reach contributes more sediment than Sugar Creek, but most of the sediment load discharged from the Meadow Creek reach is deposited in the Yellow Pine pit (Etheridge 2015). Load modeling by Etheridge (2015) also showed that about 90 percent of coarse-grained sediment derived from upgradient is deposited in the Yellow Pine pit, but over 80 percent of the fine-grained sediment (<0.0625 millimeter in diameter) entering the pit passes through and is transported downstream. Thus, the Yellow Pine pit is an effective sediment trap for coarse-grained particles but does not have a long enough residence time to deposit the vast majority of the fine-grained sediment load.

3.9.3.1.1.7 Organic Carbon

No samples were analyzed for organic carbon during the Surface Water Quality Baseline Study (HDR 2017). However, a previous study by Holloway et al. (2017) found relatively low dissolved organic carbon concentrations (1.1 to 1.7 mg/L) in the EFSFSR, Meadow Creek, and Sugar Creek. The dissolved organic carbon concentrations in a watershed can be correlated to vegetation density, vegetation type, and soil composition, with higher vegetation densities and organic-rich soils resulting in higher levels of organic carbon (Camino-Serrano et al. 2014; Larsen et al. 2011; Mzobe et al. 2018). Thus, dissolved organic carbon concentrations are expected to be low in the mountainous mine site drainage area containing poorly developed mineral soils and sparse vegetation.

3.9.3.1.1.8 Impaired Waterbodies

The federal CWA requires states to prepare a report listing the current condition of all state waters and identifying streams that are impaired because they do not meet their designated beneficial uses. IDEQ's 2016 Integrated Report (IDEQ 2018) provides the Section 305(b) list (condition of state waters) and the Section 303(d) list of impaired waters in the State of Idaho. Stream segments identified on the Section 303(d) list are classified as Category 5 waters, defined as waters that do not meet applicable water quality standards for one or more beneficial uses due to one or more pollutants.

Based on data from the 2016 Integrated Report, all inventoried waterbodies at the mine site are classified as Category 5 impaired waters except for West End Creek (which is a Category 2 stream that fully supports its designated uses). A summary of the current designated beneficial uses and causes of impairment for the impaired waterbodies at the mine site is provided in **Table 3.9-11**. The causes for listing are associated with arsenic, with the EFSFSR also being listed for antimony (downstream of Meadow Creek), and Sugar Creek also being listed for mercury. The listed constituents are similar to the constituents of interest identified in the Surface Water Quality Baseline Study (HDR 2017).

Table 3.9-9 Summary of Baseline Total Suspended Solids for Surface Water Assessment/Prediction Nodes

Assessment Node	Total Suspended Solids (mg/L)																													
	YP-T-27 (n=35)			YP-T-22 (n=35)			YP-SR-10 (n=35)			YP-SR-8 (n=35)			YP-T-11 (n=35)			YP-SR-6 (n=35)			YP-T-6 (n=34)			YP-T-1 (n=35)			YP-SR-4 (n=35)			YP-SR-2 (n=35)		
Month	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max
January	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-
February	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
March	-	5	-	-	6.5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-
April	5	5.167	5.5	5	9.167	17.5	5	8.333	13.5	5	7.5	9.5	5	5	5	5	5.5	6	-	5	-	5	6.5	9.5	5	7.833	13.5	5	5.5	6.5
May	5	6.5	8	8	27.38	73.5	5	8.25	16	5	9.875	24.5	5	12.25	34	5	7.875	13.5	5	5.25	6	5	17.62	33.5	5	5.5	7	5	6.875	10
June	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
July	5	5	5	5	5	5	5	5.667	7	5	5.833	7.5	5	5	5	5	6	8	5	15.5	36.5	5	5	5	5	6.833	10.5	5	5	5
August	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	11.25	30	5	5	5	5	5	5
September	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-
October	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-
November	5	5	5	5	5	5	5	5	5	5	6.25	10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
December	-	5	-	-	17.75	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-	-	5	-

Table Source: HDR 2017

Table Notes:

Where sample number is <3, only average values are reported.

- = No monitoring data available.

mg/L = milligrams per liter.

Min = minimum.

Max = maximum.

Table 3.9-10 Summary of Baseline Turbidity for Surface Water Assessment/Prediction Nodes

Assessment Node	Turbidity (NTU)																												
	YP-T-27 (n=35)			YP-T-22 (n=35)			YP-SR-10 (n=35)			YP-SR-8 (n=35)			YP-T-11 (n=35)			YP-SR-6 (n=35)			YP-T-6 (n=34)			YP-T-1 (n=35)			YP-SR-4 (n=35)			YP-SR-2 (n=35)		
Month	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max
January	-	3.6	-	-	6.65	-	-	2.8	-	-	2.55	-	-	3.1	-	-	3.3	-	-	4.1	-	-	3.15	-	-	3.1	-	-	2.2	-
February	0	1.3	2.8	0.5	2.275	3.1	0	1.4	2.3	0	0.925	2.1	0	1.85	4.2	0	2.925	8.1	2.7	5.875	13	0	1.925	5.6	0	2.85	5.9	0	1.7	3.1
March	-	2.85	-	-	4.9	-	-	2.2	-	-	2.2	-	-	2.25	-	-	2.35	-	-	2.15	-	-	2.6	-	-	2.6	-	-	2.95	-
April	1.6	4.6	9	2.8	10.9	25	2.1	8.9	18	3.5	7.367	11	3	6.867	12	4.4	13.73	30	-	1.7	-	4.3	10.1	19	6.1	18.17	41	5.1	15.37	27
May	2.8	4.25	5.5	4.9	23.88	70	2.6	5.875	8.2	3	5.95	8.7	3.8	6.45	13.1	4	16.58	50	1.7	4.325	5.5	4.7	14.92	22	5.4	9.1	16	2.9	6.4	10
June	1.1	5.033	12	1.7	4.4	8.8	0.4	1.633	2.5	1.2	3.2	6.2	0.1	2.2	4	0.4	3.4	5.6	1.3	2.033	3.2	1.3	2.133	2.9	0.6	2.467	3.6	2.4	3.067	4
July	0	1.133	1.8	0	1.167	2.1	0.5	1.9	2.8	0.5	1.967	2.7	0.8	1.633	2.5	2.1	2.967	3.9	1.1	3.233	6.5	1.4	2	2.8	1.9	10.4	27	0.3	2.633	6.4
August	0	1.275	3.3	0	1.375	2.6	0	0.925	2.1	0.4	1.2	2.6	0.4	1.325	1.7	0.5	1.225	2.3	0.3	1.575	2.3	0	0.65	2.6	1.1	1.7	2.6	0.1	0.875	1.9
September	-	1.55	-	-	1.25	-	-	1.85	-	-	1.95	-	-	1.25	-	-	3.05	-	-	1.75	-	-	0.75	-	-	2.45	-	-	1.95	-
October	-	2.2	-	-	2.35	-	-	3.2	-	-	2.05	-	-	1.3	-	-	1.9	-	-	6.95	-	2.2	-	-	-	2.85	-	-	2.15	-
November	1.2	2.275	3.1	1.3	2.75	5.3	0.6	1.85	3.1	0.6	2.775	5.5	1.5	1.95	3.2	1.7	3.45	4.6	2.1	2.625	3.2	0.4	1.45	2.4	2	3.575	5.6	0.3	2.525	4.6
December	-	3.05	-	-	8.65	-	-	2.5	-	-	2.85	-	-	2.6	-	-	3.5	-	-	3.65	-	3.3	-	-	-	3.7	-	-	2.7	-

Table Source: HDR 2017

Table Notes:

NTU = Nephelometric Turbidity Units.

Where sample number is <3, only average values are reported.

- = No monitoring data available.

Min = minimum.

Max = maximum.

Table 3.9-11 IDEQ Designated Beneficial Uses and Waterbody Status at the Mine Site

NHD Waterbody[1]	Beneficial Uses[2]	IDEQ Status[2]	Cause of Impairment[2]	IDEQ Category[2]
East Fork South Fork Salmon River 3rd order	COLD, DWS, SCR, SS	Not supporting DWS and SCR	Antimony (DWS), arsenic (DWS, SCR)	303(d) listed Category 5
East Fork South Fork Salmon River 1st and 2nd order	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
Unnamed tributary to EFSFSR (Rabbit Creek)	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
Meadow Creek	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
Garnet Creek	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
Fiddle Creek	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
Midnight Creek	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
Unnamed tributary to EFSFSR (Hennessy Creek)	COLD, DWS, PCR, SCR, SS	Not supporting DWS and SCR	Arsenic	303(d) listed Category 5
West End Creek	COLD, SCR, SS	Fully supporting	-	Category 2
Sugar Creek (3rd order Cane Creek to mouth)	COLD, PCR, SCR, SS	Not supporting COLD and SCR	Arsenic (SCR), mercury (COLD)	303(d) listed Category 5

Table Source: Brown and Caldwell 2017

Table Notes:

1 National Hydrography Dataset (NHD) waterbody Proper Name. Parenthesized names are unofficial but locally common names included for clarity.

2 Status and causes from 2016 Integrated Report (IDEQ 2018). COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; SCR = secondary contact recreation; DWS = drinking water supply; SCR = secondary contact recreation.

3.9.3.1.2 Access Roads, Utilities, and Off-Site Facilities

The *Surface Water Quality Baseline Study* (HDR 2017) did not include sample locations outside of the proposed mine site. However, streams adjacent to proposed access roads, utility corridors, and off-site facilities still have the potential to be impacted by SGP activities. The types of impacts that could occur are usually described qualitatively because little is known about the existing water quality of these streams. However, for Category 5 waters that have a 303(d)-listed water quality impairment, it is possible to conduct a more specific analysis evaluating how levels of the impaired constituent(s) may be impacted by SGP activities.

IDEQ has inventoried 11 lakes and 701 different stream segments in the surface water quality analysis area. Of these features, 66 are classified as Category 5 waters. **Figure 3.9-14** shows the inventoried stream segments within the analysis area, broken down by “Fully Supporting” beneficial uses (Categories 1 and 2), “Not Assessed” (Category 3), “Not Supporting” beneficial uses (Category 4), and “Not Supporting/303(d) Listed” (Category 5).

In the western portion of the analysis area, waters that are not supporting beneficial uses are concentrated in the agricultural valley that drains towards Lake Cascade (Cascade Reservoir). Causes for the listing of these waters are largely tied to phosphorus and flow regime alteration, with some streams also listed for temperature, sedimentation/siltation, and biota/habitat assessment considerations. Cascade Reservoir is specifically listed for phosphorus and pH.

In the central portion of the analysis area, waters that are not supporting beneficial uses are primarily associated with the South Fork Salmon River and its tributaries, and Johnson Creek and its tributaries. Causes for listing of the South Fork Salmon River and tributaries are primarily associated with temperature and sedimentation/siltation; causes for listing of Johnson Creek and tributaries are primarily associated with temperature.

Impaired waterbodies in the eastern portion of the analysis area are primarily associated with the mine site. Water quality impairments for the mine site streams have been discussed above and are summarized in **Table 3.9-11**.

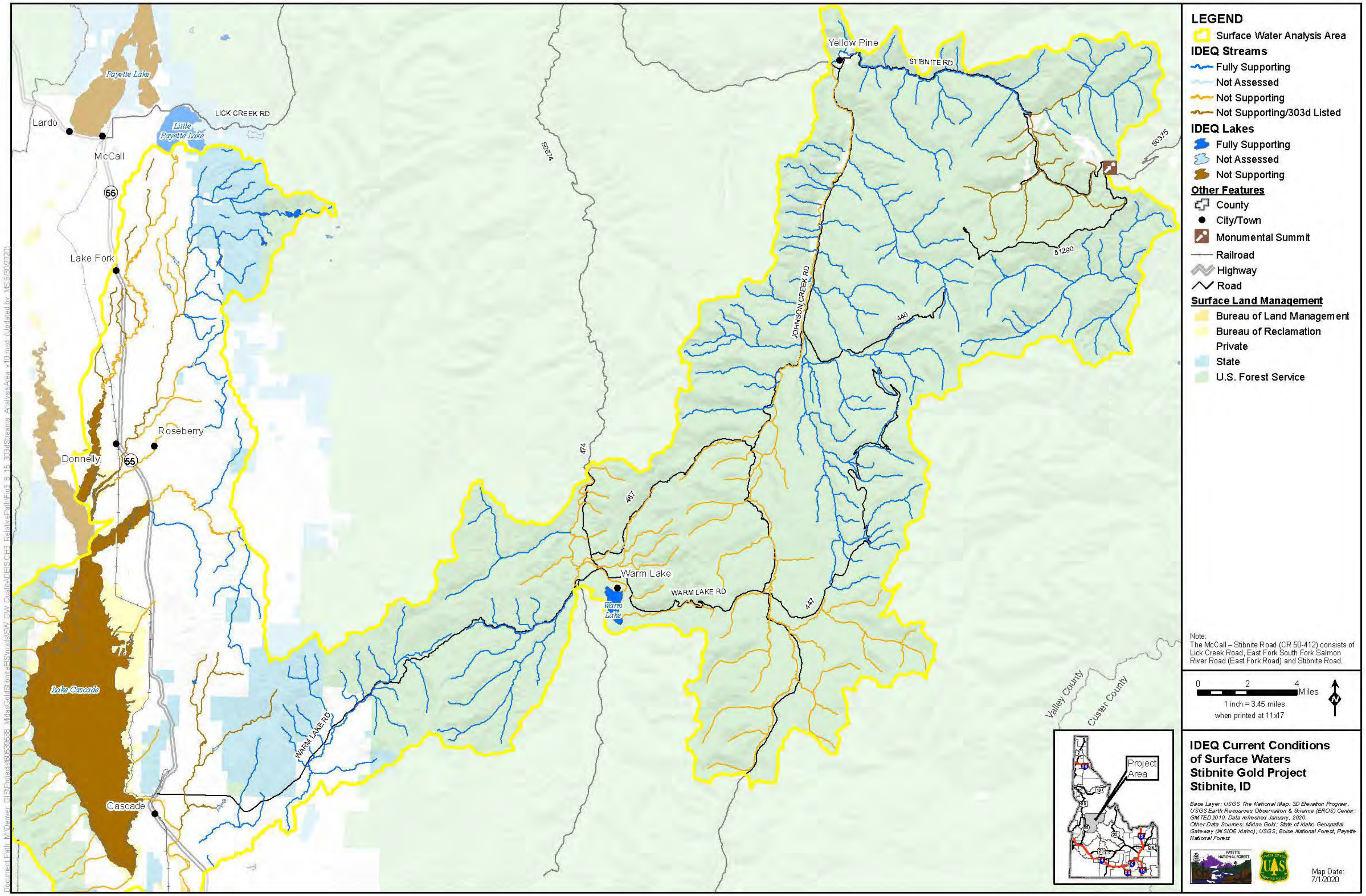

Figure Source: AECOM 2020

Figure 3.9-14 IDEQ Current Conditions of Surface Waters

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3.9.3.2 Groundwater Quality

This section focuses on quantifying the baseline groundwater chemistry in areas monitored by the 17 monitoring wells of interest listed in **Table 3.9-12**. The discussion of baseline chemistry is organized around the groundwater quality indicators, which include pH, major cations and anions, TDS, and metals.

It should be noted that baseline water quality at the mine site is influenced by both natural mineralization and historical mining activity. The geochemistry subsection (Section 3.9.3.3) describes the influence of these features on groundwater quality.

3.9.3.2.1 Major Ions, pH, and TDS

Average baseline water quality characteristics measured between 2012 and 2018 for the groundwater monitoring wells of interest are summarized in **Table 3.9-12**. A trilinear diagram for a larger subset of wells also is provided on **Figure 3.9-15** for the August 2013 baseline monitoring event. This event was selected for comparison because it included data from each of the 17 wells of interest.

The trilinear diagram reveals several trends in groundwater composition. First, calcium tends to be the dominant cation in most of the alluvial monitoring wells. Also, both alluvial and bedrock groundwater tends to contain very little chloride. The anion chemistry for the groundwater monitoring wells plots along a continuum between the two end members of 100 percent bicarbonate and 100 percent sulfate dominance. As a result, most alluvial wells in the mine site have a calcium bicarbonate water quality signature, but a few wells (MWH-A05, MWH-A07, MWH-A18, and MWH-A19) exhibit a calcium-sulfate water type. The calcium-sulfate wells are located proximal to and immediately downgradient of legacy mining facilities (HDR 2016).

Overall, the major ion chemistry of alluvial groundwater at the mine is similar to surface water, illustrating the interconnectedness between the groundwater and surface water systems.

Most of the bedrock monitoring wells also display a calcium-bicarbonate water quality signature. Notably, several alluvial and bedrock well pairs plot together in this category, including the A01 and B01, A02 and B02, A09 and B09, and A12 and B12 well pairs. Many of these wells are screened at relatively shallow depths below ground surface near the valley walls where the alluvial aquifer is thinner (HDR 2016), and the bedrock is hydraulically connected to the alluvium deposits.

Despite the overall dominance of calcium and bicarbonate, the major ion chemistry of the bedrock aquifer tends to be more variable than the alluvium. For instance, samples from bedrock wells MWH-B03, MWH-B04, and MWH-B07 consistently have sodium and bicarbonate as the major cation-anion pair. These wells are screened at deeper depths near the center of the alluvial valleys. Monitoring well MWH-B05 typically exhibits monthly variations in the major ion geochemistry. Similarly, bedrock wells MWH-B10, MWH-B13, and MWH-B15 tend to plot in the middle of the diamond on the trilinear diagram (**Figure 3.9-15**), indicating that no cation-anion pair is consistently dominant.

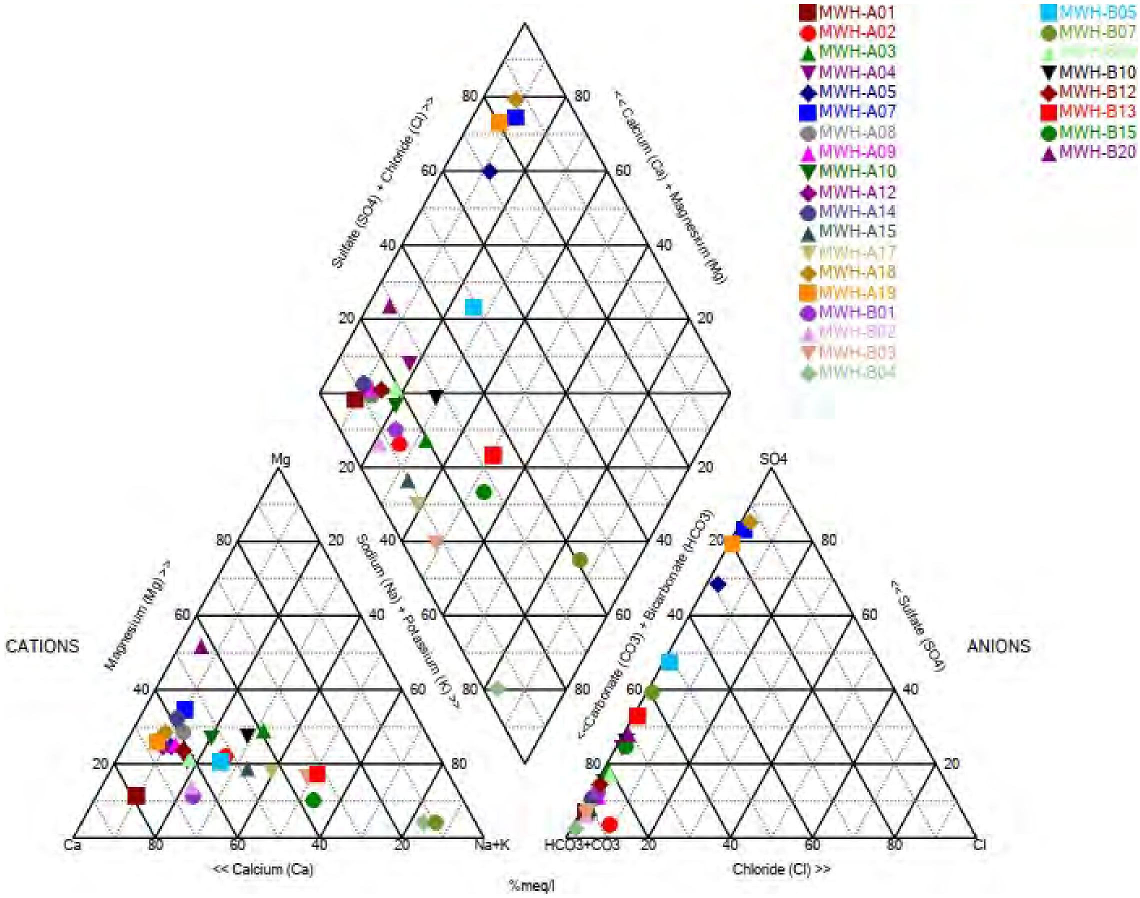

Figure Source: HDR 2016, Appendix G

Figure 3.9-15 Tri-Linear Diagram for Alluvial and Bedrock Wells, August 2013

Average TDS concentrations in the groundwater wells of interest are variable but tend to be less than the 500 mg/L Idaho secondary groundwater standard. The average TDS values shown in **Table 3.9-12** range from 58 to 465 mg/L for the alluvial wells, and from 60 to 415 mg/L for the bedrock wells.

Table 3.9-12 Average Groundwater Chemistry (2012 to 2018) for Select Alluvial and Bedrock Wells

Proposed Mine Feature			TSF	Hangar Flats DRSF		Hangar Flats Pit				Meadow Creek Valley		Yellow Pine Pit			Fiddle DRSF		West End Pit/ DRSF	EFSFSR TSF	Upgradient
Parameter	Units	Idaho Groundwater Quality Standard (IDAPA 58.01.11)	Alluvial aquifer (MWH-A01)[1]	Alluvial aquifer (MWH-A02)[1]	Bedrock aquifer (MWH-B02)[1]	Alluvial aquifer (MWH-A04)[1]	Bedrock aquifer (MWH-B04)[1]	Alluvial aquifer (MWH-A05)[1]	Bedrock aquifer (MWH-B05)[1]	Alluvial aquifer (MWH-A07)[1]	Bedrock aquifer (MWH-B07)[1]	Alluvial aquifer (MWH-A18)[1]	Alluvial aquifer (MWH-A19)[1]	Alluvial aquifer (MWH-A14)[1]	Alluvial aquifer (MWH-A15)[1]	Bedrock aquifer (MWH-B15)[1]	Bedrock aquifer (MWH-B20)[1]	Alluvial Aquifer (MWH-A08)[1]	Bedrock Aquifer (MWH-B01)[1]
pH	s.u.	*6.5 - 8.5**	7.46	6.9	6.67	6.62	8.86	6.62	7.04	**6.09**	8.15	**6.19**	6.34	7.64	7.09	8.39	8.12	7.04	**8.56**
Alkalinity	mg/L as $CaCO_3$	-	59.9	138	39.3	56.3	174	104	176	65.8	214	25.6	22.4	119	25.6	82.1	157	71.9	66
Ag	mg/L	*0.1**	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00003	<0.00002
Al	mg/L	*0.2**	0.0068	0.0046	0.054	0.0067	0.038	0.0045	0.017	0.028	**0.28**	0.035	0.0085	0.0052	0.0046	**0.24**	0.0029	0.0066	0.019
As	mg/L	*0.05*	0.0064	0.0055	0.00054	**1.1**	**0.11**	**1.9**	**0.14**	**0.2 0**	**0.25**	0.033	**4.7**	**0.35**	**0.087**	**0.32**	**0.3**	0.019	0.013
B	mg/L	-	0.01	0.01	0.011	0.013	0.051	0.023	0.018	0.012	0.031	0.0098	0.011	0.009	0.011	0.024	0.008	0.009	<0.011
Ba	mg/L	*2*	0.0019	0.021	0.0029	0.01	0.64	0.033	0.049	0.018	0.019	0.017	0.046	0.016	0.017	0.041	0.048	0.045	0.0037
Be	mg/L	*0.004*	<0.00002	<0.00002	0.000021	<0.00002	<0.00002	<0.00002	<0.00002	0.000027	0.000065	0.00017	0.000013	<0.00002	<0.00002	0.00005	<0.00002	<0.00002	<0.00002
Ca	mg/L	-	18	30.7	10.4	18.1	7.69	83.5	65.4	75.6	14.5	83.9	36.5	32	5.11	15.5	34.9	19	18.8
Cd	mg/L	*0.005*	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.000035	<0.00002	0.000038	0.000017	0.000023	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	<0.00002
Cl	mg/L	*250**	0.3	7.4	0.27	0.52	0.28	9.2	2.1	2.5	1. 8	6	0.72	0.47	0.42	0.97	0.28	0.4	0.4
Cyanide	mg/l	*0.2*	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	0.011	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027	<0.0027
Co	mg/L	-	0.0001	0.00099	0.00028	0.00071	0.00017	0.00188	0.00073	0.0033	0.00042	0.00025	0.00011	0.00023	0.000054	0.00069	0.00014	0.00006	0.00014
Cr	mg/L	*0.1*	0.00028	0.00026	0.0002	0.00017	0.00043	0.00014	0.0003	0.00019	0.00057	0.00019	0.00028	0.00027	0.00014	0.00026	0.00027	0.00026	0.00022
Cu	mg/L	*1.3*	0.00048	0.00032	0.00038	0.00094	0.00061	0.0016	0.0016	0.0014	0.0007	0.00063	0.001	0.00056	0.00013	0.00041	0.00043	0.0022	0.00035
F	mg/L	*4*	0.11	0.11	0.094	0.1	0.68	0.15	0.89	0.17	3.2	0.16	0.15	0.11	0.09	0.59	0.12	0.11	0.23
Fe (total)	mg/L	*0.3**	0.134	**2.8**	**1.7**	**2.1**	0.23	0.21	**0.37**	**1.3**	**1.7**	**4.3**	**1.1**	**0.38**	0.23	**6.93**	0.061	0.2	0.16
Hg	mg/L	*0.002*	5.60E-07	8.20E-06	1.40E-06	2.50E-05	8.80E-07	6.60E-05	1.50E-06	1.00E-05	1.80E-06	2.70E-06	2.00E-06	6.60E-07	7.40E-07	3.80E-06	4.30E-07	7.40E-07	5.80E-07
K	mg/L	-	0.77	1.5	0.58	1.3	1.2	2.7	2.4	3.6	1	2	1.4	1.7	0.9	0.95	3.13	1.58	0.66
Mg	mg/L	-	1.48	8.07	1.17	3.26	1.78	20.6	15.5	31.4	3.77	22.1	8.02	10.63	1.15	2.29	24.1	5.32	1.89
Mn	mg/L	*0.05**	0.001	**2.8**	0.012	**1.1**	**0.07**	**2.2**	**0.07**	**0.36**	0.021	0.026	0.0021	0.0039	0.0009	0.019	0.01	0.001	0.0013
Mo	mg/L	-	0.0012	0.0023	0.0003	0.001	0.0036	0.0016	0.0048	0.0022	0.012	0.00008 9	0.00031	0.003	0.00023	0.0051	0.0045	0.00086	0.0061
Na	mg/L	-	2.68	15.4	3.91	5.33	70	15.24	49.2	8.19	133	4.58	3.72	3.9	3.58	27.8	2.55	3.58	7
Ni	mg/L	-	0.00021	0.00079	0.00038	0.00061	0.00026	0.0024	0.0012	0.0014	0.00054	0.0017	0.00058	0.00045	0.00017	0.00051	0.00093	0.00027	<0.0002
P	mg/L	-	0.024	0.033	0.02	0.066	0.023	0.044	0.053	0.031	0.021	0.023	0.32	0.023	0.038	0.026	0.026	0.018	0.022
Pb	mg/L	*0.015*	0.000029	0.000046	0.000055	0.000047	0.000064	0.0000 4	0.00013	0.000042	0.00023	0.000021	0.000036	0.00004	<0.00002	0.00021	0.000037	0.00012	0.000034
Sb	mg/L	*0.006*	0.002	9.10E-05	0.0016	**0.0013**	0.00062	**0.12**	**0.12**	**1.08**	0.0011	**0.2**	**0.01**	**0.0422**	0.004	**0.01**	**0.019**	**0.015**	0.0044
Se	mg/L	*0.05*	<0.001	<0.001	<0.001	0.00092	0.00098	0.00 076	0.00085	0.0008	0.00094	0.00078	0.0016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO_4	mg/L	*250**	3.91	4.79	2.63	17.8	5.86	214	153	**260**	112	**270**	103	11.95	2.38	26.9	37.5	8.88	8.31

Proposed Mine Feature			TSF	Hangar Flats DRSF		Hangar Flats Pit				Meadow Creek Valley		Yellow Pine Pit			Fiddle DRSF		West End Pit/ DRSF	EFSFSR TSF	Upgradient
Parameter	Units	Idaho Groundwater Quality Standard (IDAPA 58.01.11)	Alluvial aquifer (MWH-A01)[1]	Alluvial aquifer (MWH-A02)[1]	Bedrock aquifer (MWH-B02)[1]	Alluvial aquifer (MWH-A04)[1]	Bedrock aquifer (MWH-B04)[1]	Alluvial aquifer (MWH-A05)[1]	Bedrock aquifer (MWH-B05)[1]	Alluvial aquifer (MWH-A07)[1]	Bedrock aquifer (MWH-B07)[1]	Alluvial aquifer (MWH-A18)[1]	Alluvial aquifer (MWH-A19)[1]	Alluvial aquifer (MWH-A14)[1]	Alluvial aquifer (MWH-A15)[1]	Bedrock aquifer (MWH-B15)[1]	Bedrock aquifer (MWH-B20)[1]	Alluvial Aquifer (MWH-A08)[1]	Bedrock Aquifer (MWH-B01)[1]
Tl	mg/L	*0.002*	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
V	mg/L	-	0.00031	0.00047	0.00021	0.00051	0.0003	0.00074	0.00047	0.00016	0.0009	0.00013	0.00073	0.00022	0.00044	0.0009	0.00013	0.0004	0.00033
Zn	mg/L	*5**	0.0011	0.0014	0.0015	0.0016	0.0015	0.0019	0.011	0.0039	0.0062	0.0058	0.0014	0.0015	0.001	0.0017	0.028	0.0023	0.0011
TDS	mg/L	*500**	75.4	170	60.3	103	185	434	410	465	415	448	205	144	57.9	172	198	93.8	86.4
$NO_3 + NO_2$	mg/L as N	*10*	0.078	0.046	0.17	0.047	0.044	0.12	0.21	0.19	0.046	0.31	0.39	0.33	0.076	0.045	0.05	0.18	0.047

Table Source: Brown and Caldwell 2019; HDR 2016; Midas Gold 2019; SRK Consulting (SRK) 2018a

Table Notes:

1 Represents average chemistry measured during the 2012-2018 baseline period. Concentration values represent the dissolved fraction unless otherwise noted.

2 Bolded values exceed the respective Idaho Groundwater Quality Standard (IDAPA 58.01.11).

DRSF = Development rock storage facility.

TSF = Tailings storage facility.

mg/L = milligrams per liter.

- Indicates no standard for parameter.

* Indicates secondary standard.

< = less than detection limit.

Field-measured pH values for the groundwater wells of interest were generally in the range of 6.1 to 8.9 standard units. The highest average pH (8.86) was observed in bedrock well MWH-B04. This pH value slightly exceeds the Idaho secondary groundwater standard. Overall, the slightly acidic to alkaline pH values observed in groundwater near the mine site show that the geochemistry of natural mineralized deposits and legacy mine materials is not conducive to widespread acid rock drainage.

3.9.3.2.2 METALS

The Groundwater Quality Baseline Study (HDR 2016) showed that several metals are present in mine site groundwater at concentrations that exceed the Idaho primary and secondary groundwater quality standards listed in **Table 3.9-2**. The constituents exceeding applicable standards typically include antimony, arsenic, iron, and manganese in the alluvial aquifer, and aluminum, antimony, arsenic, and iron in the bedrock aquifer. Based on **Table 3.9-12**, average concentrations measured for the monitoring wells of interest are representative of the broader baseline study findings. Data presented in this table show that average concentrations of pH, aluminum, arsenic, iron, manganese, and antimony exceed the groundwater quality standards from **Table 3.9-2** at one or more wells.

Based on these findings, antimony and arsenic were identified as constituents of interest in groundwater. This determination is supported by the fact that groundwater quality criteria associated with antimony and arsenic were established to protect human health, whereas criteria for iron, aluminum, and manganese are based on secondary standards established to protect aesthetic and cosmetic qualities of drinking water. Mercury was not identified as a groundwater constituent of interest, because both total and dissolved mercury concentrations were consistently reported below the water quality standard in the alluvial and bedrock monitoring wells. Although certain waterways in the Stibnite Mining District have drinking water supply as a designated use, and Idaho groundwater quality standards apply throughout the Stibnite Mining District, there are no current, contemplated, or likely future public water supply intakes or wells in the zones where metals levels exceed applicable standards.

Figure 3.9-16 illustrates the trend in dissolved antimony concentrations for groundwater monitoring locations across the mine site. During the baseline study, the fraction of antimony adsorbed onto solid particulates was found to be small, suggesting that the antimony concentration is adequately represented by the dissolved phase of this constituent (HDR 2016). The figure shows that mean dissolved antimony concentrations are generally below the 6 µg/L Idaho primary groundwater standard in the Meadow Creek valley; however, antimony concentrations increase by two to three orders of magnitude at some of the downgradient alluvial and bedrock wells, such as MWH-A05, MWH- B05, and MWH-A07. Immediately below the confluence with Meadow Creek, groundwater antimony concentrations in the lower EFSFSR alluvial aquifer are elevated above the primary groundwater standard but generally decrease in concentration downgradient. It is noteworthy that baseline dissolved antimony concentrations exceed the Idaho primary groundwater standard in wells MWH-A14 and MWH-B15 upgradient of Yellow Pine pit and near the proposed location of the Fiddle DRSF. In the Sugar Creek valley, the average dissolved antimony concentration also is above the Idaho primary groundwater standard in bedrock well MWH-B20 near the proposed location of the West End pit and West End DRSF.

For most samples collected during the Groundwater Quality Baseline Study (HDR 2016), 90 to 100 percent of arsenic was found to occur in the dissolved fraction. **Figure 3.9-17** illustrates the trend in dissolved arsenic concentrations for groundwater monitoring locations across the mine site. The figure shows that near wells MWH-A01 and MWH-A03 in the upper Meadow Creek valley, dissolved arsenic is on average higher in the bedrock aquifer than in the alluvium. This trend is reversed farther downgradient in the valley, where monitoring wells MWH-A04 and MWH-A05 have some of the highest average dissolved arsenic concentrations observed during baseline monitoring. The increase in dissolved arsenic in this area is likely due to the influence of historical mining materials (Section 3.9.3.1.1.2, Primary Constituents of Interest [Antimony, Arsenic, and Mercury]).

In both the alluvial and bedrock aquifer, average dissolved groundwater arsenic concentrations were mostly above the primary groundwater standard in the lower EFSFSR and Sugar Creek valleys. This includes groundwater monitoring wells MWH-A14, MWH-A15, MWH-B15, and MWH-B20 near Yellow Pine pit and the proposed locations of the Fiddle and West End DRSFs.

Overall, dissolved concentrations of antimony and arsenic fluctuate seasonally, but to a lesser extent in bedrock wells than in alluvial wells. Concentrations are in general lower during spring and higher during the fall. This suggests that the concentrations are being diluted in springtime by freshwater recharge, but that concentrations increase during fall when groundwater levels typically approach seasonal lows.

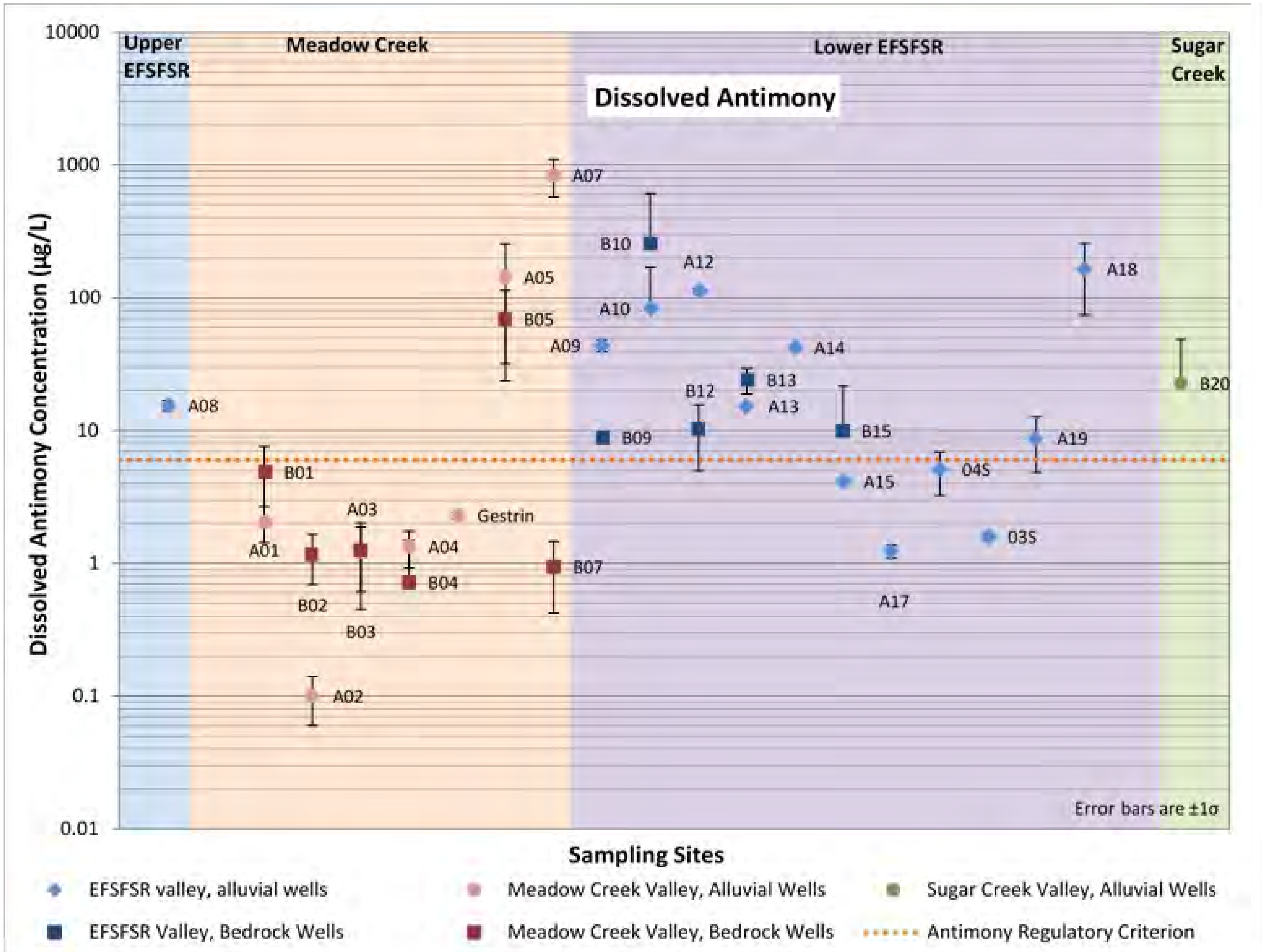

Figure Source: Brown and Caldwell 2017, Figure 8-32

Figure 3.9-16 Box and Whisker Plots for Average Groundwater Dissolved Antimony Concentrations

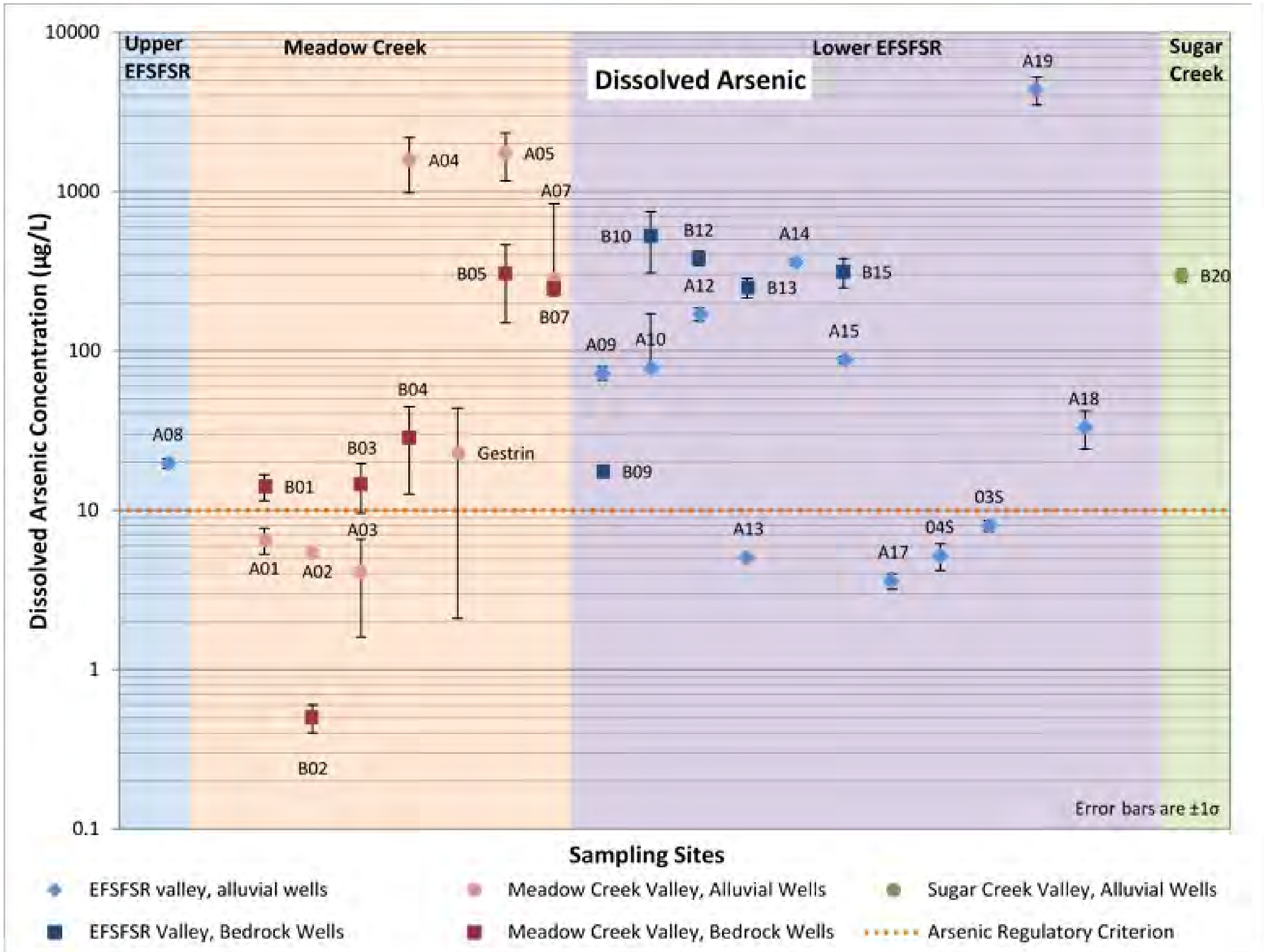

Figure Source: Brown and Caldwell 2017, Figure 8-34

Figure 3.9-17 Box and Whisker Plots for Average Groundwater Dissolved Arsenic Concentrations

3.9.3.3 Geochemistry

3.9.3.3.1 Geology and Mineralization

The geochemistry of the mine site is influenced by both the bedrock geology (including naturally occurring mineralization) and a legacy of historical mining activity that has altered the natural environment (Baldwin and Etheridge 2019). Locally, the Yellow Pine and Hangar Flats deposits are hosted by intrusive igneous rock associated with the Atlanta Lobe of the Idaho Batholith. Both deposits are situated along the Meadow Creek Fault Zone, a generally north trending, variably dipping, but near vertical complex fault zone that can be traced from north of the main Yellow Pine deposit south 1.85 miles through the Hangar Flats deposit, and beyond (SRK 2017). The West End deposit is hosted by metasedimentary rocks of the Stibnite roof pendant located in the Atlanta Lobe of the Idaho Batholith. **Figure 3.2-2** illustrates the various lithologic units located within the SGP area.

Both intrusive igneous rocks and metasedimentary rocks in the SGP area have undergone hydrothermal alteration associated with either Cretaceous magmatic events and/or Tertiary volcanic activity. Potassic and sodic metasomatism and widespread sericitization are characteristic of the earlier hydrothermal alteration event, while silicification and lower temperature hydrothermal alteration occurred in association with tertiary volcanic activity.

In the mine site ore deposits, precious metals (gold and silver) typically occur in association with very fine-grained disseminated arsenical pyrite ($Fe(S,As)_2$), and to a lesser extent, arsenopyrite (FeAsS) (SRK 2017). Antimony occurs as the mineral stibnite (Sb_2As_3) often in the same areas as precious metals mineralization but in deposits that are cross-cutting and generally more confined in distribution. Base metal sulfides (e.g., zinc, copper, and lead) are rare and occur at very low concentrations, at or below typical crustal abundance levels. Various oxidized products derived from weathering of the primary sulfides are associated with the intrusive rocks, including goethite, hematite, jarosite, and scorodite, and host precious metal mineralization in the oxidized portions of the deposits.

Metasediment-hosted mineralization in the West End deposit has a similar sulfide suite and geochemistry, but with higher carbonate content in the gangue and a much more diverse suite of late stage minerals. As in the intrusive-hosted mineralization, gold is associated with very fine-grained arsenical pyrite. Antimony mineralization is generally rare in the West End deposit.

The primary intrusive and metasedimentary rock types at the mine site include alaskite, granodiorite (i.e., quartz monzonite), diorite, rhyolite, calc-silicate, carbonates (e.g., dolomite and limestone), quartzite, stibnite stock, schist, breccia, gouge, and granite (SRK 2017). The intrusive rocks associated with the Yellow Pine and Hangar Flats deposits are predominantly composed of quartz monzonite and alaskite. In contrast, the metamorphosed sedimentary rocks of the West End deposit generally consist of calc-silicate, carbonates, quartzite, and schist.

The intrusive and metasedimentary mineralization of the main ore deposits has been extensively drilled during exploration and development, as well as during past mining operations focused on the previously exploited ores. The drilled materials represent the composition of future development rock and ore, as well as historical mine wastes. Samples from these holes were tested for leachable metals, including multi-element analysis (SRK 2017).

Results from the multi-element testing show that arsenic, mercury, sulfur, and antimony are enriched in the Yellow Pine, Hangar Flats, and West End ore bodies. These elements are typically associated with gold deposits (Rose et al. 1979) and their enrichment in the samples reflects the natural mineralization in the area. The enrichment of arsenic, mercury, sulfur, and antimony is generally more pronounced for the ore grade material (with a gold concentration greater than approximately 0.5 gram per ton) as would be expected; however, some of the waste grade material also is enriched with respect to these constituents (SRK 2017).

3.9.3.3.2 Geochemical Influence of Historical Mining Wastes

Mining and mineral processing, primarily of gold, antimony, and tungsten, have occurred at and in the vicinity of the mine site intermittently since the early 1900s. Historical features at the mine site are shown on **Figure 3.7-2**. The types of waste generated by past mining activity include spent ore in the SODA and heap leach pads, tailings (i.e., Bradley tailings), and waste rock in the Bradley and West End dumps. These historical mining wastes have created numerous geochemical changes and legacy impacts typical for this type of mining district that are part of the affected environment. The following sections describe the geochemical influence of the historical mining wastes on water quality.

Although tungsten was previously mined in the SGP area, it was not analyzed during the Surface Water Quality Baseline Study (HDR 2017) because it is not a common water quality constituent and does not have an Idaho surface water standard. Tungsten also is relatively insoluble in natural waters with pH less than 8 (Johannessen et al. 2013).

3.9.3.3.2.1 Surface Water

Locally, concentrations of antimony, arsenic, mercury, and cyanide in surface water are potentially attributable to the geochemistry of historical mining wastes present at the mine site (URS, Inc. [URS] 2000). In the late 1990s, concentrations of antimony and arsenic in Meadow Creek were highest immediately below the historical Bradley tailings deposits in the lower Meadow Creek valley, suggesting that the Bradley tailings provide a continuous source of antimony and arsenic in Meadow Creek (URS 2000). This conclusion also is supported by recent data collected during Midas Gold's surface water quality baseline study, which indicate that dissolved antimony concentrations in Meadow Creek increase from an average of 0.32 µg/L at YP-T-33 above the SODA (**Figure 3.9-3**) to 6.1 µg/L at YP-T-27 below Keyway Marsh. Average dissolved arsenic concentrations also increase along this stretch from 1.2 µg/L at YP-T-33 to 34.8 µg/L at YP-T-27 (Midas Gold 2019). Farther downstream in Meadow Creek and the EFSRSR, average dissolved arsenic concentrations remain largely stable (**Figure 3.9-8**), but average dissolved antimony concentrations continue to increase, reaching a high of 31.0 µg/L at EFSFSR assessment node YP-SR-4 (**Table 3.9-5**). The increase in dissolved antimony concentrations downstream of YP-T-27 occurs due to multiple factors including seeps and springs emanating from historical mining features; metals leached from spent ore and waste rock; in situ mineralization traversed by Meadow Creek (i.e., the Hangar Flats deposit), and other naturally occurring mineralization present throughout the EFSFSR drainage.

Mercury concentrations are not similarly elevated by the mine tailings and waste rock, despite periodically exceeding the strictest potentially applicable surface water quality standard (**Figure 3.9-9**). Although elevated concentrations of mercury are observed in Sugar Creek, these concentrations have a well-documented source in the upstream Cinnabar (mercury) Mine. Sugar Creek also traverses known mineralized occurrences (based on outcrop) along its length.

3.9.3.3.2.2 Groundwater

Bradley tailings are present in both upper Meadow Creek valley and lower Meadow Creek valley, where the tailings have been covered with approximately 40 feet of waste rock, alluvial fill material, and neutralized “spent” ore material (URS 2000). Groundwater hydrology studies have indicated that, in 1997 and 1999, the alluvial aquifer water table elevation was high enough to contact the bottom of the historical Bradley tailings deposit throughout most of the Meadow Creek valley (URS 2000). Elevated concentrations of dissolved arsenic (over 12,000 µg/L) and dissolved antimony (over 1,000 µg/L) were associated with groundwater wells screened completely or partially in the Bradley tailings material, suggesting that the historical Bradley tailings currently present throughout the Meadow Creek valley may have an adverse influence on groundwater quality within the mine site. A more recent study (Brown and Caldwell 2017) also found elevated arsenic and antimony concentrations in groundwater near the Bradley tailings and former leach pads, with concentrations higher in the alluvial aquifer than in bedrock. The water quality of nearby seeps associated with the Bradley tailings, SODA, and Keyway Dam also was elevated in metals, an indication that historical mining features are impacting the alluvial and bedrock aquifers.

In the EFSFSR valley below Meadow Creek, alluvial and bedrock water quality samples show multiple locations where arsenic and antimony are elevated above applicable groundwater quality standards from **Table 3.9-2**. Arsenic concentrations tend to be higher in the bedrock aquifer than the alluvium. The higher concentrations of arsenic in bedrock groundwater where little mining activity has occurred may reflect naturally occurring arsenic sources derived from unmined mineralized zones (Brown and Caldwell 2017).

3.9.3.3.2.3 Seeps and Springs

Historical mining activity at the mine site has contributed to the development of artificial groundwater seeps from tailings, waste rock piles, and adits. Many of these features have been present at the mine site for decades and have been sampled recently as part of baseline monitoring efforts. Natural springs and seeps also occur where bedrock faults and fractures intersect the ground surface outside the influence of tailings and historical mining features. Both the naturally occurring and man-made seep sample locations are shown on **Figure 3.9-2**.

Data from the mine spoil seeps have been compared to natural seeps. The results of this comparison indicate that at least some of the metals found in the mine spoil seeps are endemic to the region, particularly antimony and arsenic, which were found to exceed the applicable water quality criteria (listed in **Table 3.9-2**) in the majority of natural seep sites sampled (HDR 2017).

The seeps and springs in the Bradley tailings-impacted areas of the Meadow Creek valley may transport dissolved constituents from groundwater to surface water. Sulfate levels in seeps and springs were variable and ranged from 4 to 136 mg/L, and pH values in the seep and spring water samples ranged from 6.3 to 8.1, indicating that acid rock drainage is not characteristic of the seeps and springs in the mine site area (URS 2000). Sulfate and pH concentrations in the mine site springs and seeps were similar during the Surface Water Quality Baseline Study, with median values of 41.9 mg/L for sulfate and 7.21 units for pH (Brown and Caldwell 2017; HDR 2017).

Similarly, in the EFSFSR drainage, arsenic and antimony concentrations in seeps and springs are elevated below the Yellow Pine pit and Northwest Bradley waste rock dump, suggesting that these historical mine facilities may be responsible for elevated concentrations of arsenic and antimony in discharging groundwater (URS 2000).

3.10 VEGETATION: GENERAL VEGETATION COMMUNITIES, BOTANICAL RESOURCES, AND NON-NATIVE PLANTS

3.10.1 Introduction and Scope of Analysis

This section describes the status of vegetation communities, botanical resources, and non-native plants in the analysis area. For the purpose of this analysis, botanical resources are plant species listed as endangered or threatened under the Endangered Species Act (ESA) of 1973, species proposed or candidates for listing under the ESA, and U.S. Forest Service (Forest Service)-designated sensitive and forest watch plant species identified in the Payette National Forest (PNF) Land and Resource Management Plan (Payette Forest Plan) (Forest Service 2003) and/or Boise National Forest (BNF) Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2010a). For the purpose of this analysis, non-native plants are defined as those that are not native to the analysis area or are invasive, including noxious weeds designated by the Director of the Idaho State Department of Agriculture (ISDA).

The analysis area for vegetation communities, botanical resources, and non-native plants is the entire extent of lands in a 300-foot buffer on either side of all alternative components. Alternative components are the proposed mine site, all associated mine support infrastructure, all access and haul roads (proposed and existing), all utility infrastructure (proposed and upgraded), and proposed off-site facilities. The analysis area is shown in **Figure 3.10-1**. The analysis area covers approximately 18,811 acres of land, with 8,972 acres (48 percent) on the BNF, 6,407 acres (34 percent) on the PNF, 341 acres (2 percent) on the Salmon-Challis National Forest (acres that would be directly impacted by the Stibnite Gold Project [SGP] are administered by the PNF), and 3,091 acres (16 percent) outside Forest Service boundaries.

The 300-foot buffer was selected to encompass an area where direct and indirect impacts (e.g., dust, impacts to pollinators, etc.) from any alternative could impact vegetation. Analysis of direct and indirect impacts to vegetation as a result of SGP are presented in Section 4.10, Environmental Consequences, Vegetation.

3.10.2 Relevant Laws, Regulations, Policies, and Plans

3.10.2.1 Endangered Species Act

The ESA (16 United States Code [USC] Ch. 35 Section 1531 et seq. 1988) is federal legislation that is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing extinction of plants and animals. Aspects of the law pertaining to plants are administered by U.S. Fish and Wildlife Service (USFWS). The USFWS designates threatened, endangered, proposed, and candidate plant species and their critical habitats under the ESA. Candidate species have no protection under the ESA, but they are often included in the National

Environmental Policy Act process for early planning consideration. Section 7 of the ESA generally requires federal agencies, in consultation with the USFWS, to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the continued survival of any ESA-listed threatened or endangered plant species, or to adversely modify their designated critical habitat.

3.10.2.2 The National Forest Management Act

The National Forest Management Act of 1976 requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System (NFS). The National Forest Management Act, as amended, and its implementing regulations under 36 Code of Federal Regulations 219, consolidate and articulate Forest Service management planning responsibilities for lands and resources of the NFS.

3.10.2.3 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land. The Payette and Boise Forest Plans (Forest Service 2003, 2010a) establish goals, objectives, standards, and guidelines that provide a framework for the analysis of impacts on vegetation, botanical resources (including ESA-listed threatened, endangered, proposed, and candidate species and Forest Service-designated sensitive species), and non-native plants. Forest Plans are considered enforceable regulations and provide guidance to assist agency staff in administering regulations but do not supersede authorities under laws or the regulations promulgated by agencies under the authorities granted by the laws.

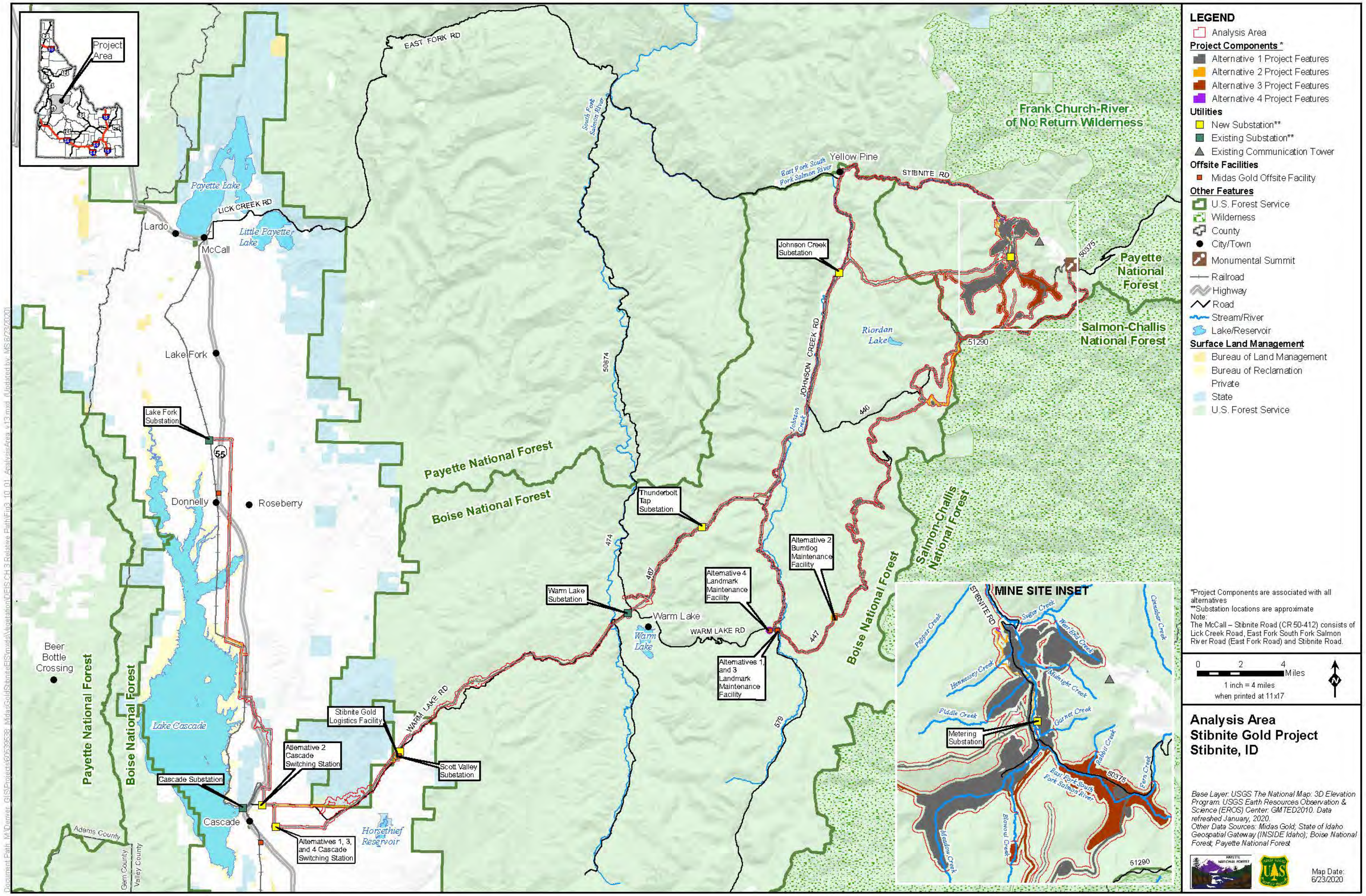

Figure Source: AECOM 2020a

Figure 3.10-1 Analysis Area

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3.10.2.4 Federal Noxious Weed Act

The Federal Noxious Weed Act of 1974 (Public Law 93-629) (7 USC 2801 et seq., 88 Stat. 2148) directs the management of undesirable plants on federal lands, including prohibiting the transport of noxious weeds into the U.S. and between states. This legislation also outlines how noxious weed infestations are to be quarantined and controlled on federal lands. This act also requires agencies to develop programs to eradicate undesirable plants and "establish and adequately fund an undesirable plants management program through the agency's budgetary process; complete and implement cooperative agreements with state agencies regarding the management of undesirable plant species on federal lands under the agency's jurisdiction; and establish integrated management systems to control or contain undesirable plant species targeted under cooperative agreements" (7 USC 2418). In addition, federal law requires agencies to consult with state and local agencies to develop a coordinated weed management effort.

3.10.2.5 Executive Order 13112

Executive Order (EO) 13112 requires that federal agencies prevent the introduction and spread of invasive species, detect and respond rapidly to control such species, monitor invasive species populations, and restore native species and habitat conditions in ecosystems that have been invaded. In addition, the order requires a federal agency to "not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species."

3.10.2.6 Forest Service Manual 2670

Forest Service Manual (FSM) 2670 (Threatened, Endangered, and Sensitive Plants and Animals) gives management direction for conservation, management, and recovery of sensitive species on Forest Service-administered lands. This FSM states that sensitive plant species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for federal listing. Under this guidance, there must be no impacts to a sensitive species without an analysis of the significance of adverse effects on the populations, its habitat, and on the viability of the species in the planning area (for this analysis, the planning area is a Forest in which a species occurs).

3.10.2.7 Forest Service Manual 2900

FSM 2900, Invasive Species Management, sets forth NFS policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens).

3.10.2.8 U.S. Department of Agriculture Regulation 9500-4

U.S. Department of Agriculture (USDA) Departmental Regulation 6500-4 outlines USDA's responsibility "to help maintain sufficient and efficient production capability of farm, forest, water, and rangeland resources for the public benefit, now and in the future, and to encourage and support proper use, management, and conservation of those natural resources" (USDA 2008). This Departmental Regulation was established to describe the USDA's goal of improving fish and wildlife habitats where needed and ensuring the presence of diverse, native and desired nonnative populations of wildlife, fish, and plant species (USDA 2008). Impacts to rare plant species in the analysis area, including those designated as forest watch species, are included in the analysis of this EIS to determine adherence to this regulation.

3.10.2.9 Sawtooth and Boise National Forests Invasive Species Project Final Environmental Impact Statement and Record of Decision

The Sawtooth and Boise National Forests Invasive Species Project Final Environmental Impact Statement (EIS) (Forest Service 2019a) documents the analysis conducted for the Sawtooth and Boise National Forests Invasive Species Project. The overall purpose of the proposed action was to reduce the negative effects of existing and future invasive plants on the structure and function of native plant communities and on other natural resource values within the administrative boundaries of the Sawtooth and Boise National Forests. The Record of Decision (ROD) for this project (Forest Service 2019b) documents selection of the EIS proposed action to eradicate or control existing or newly discovered invasive plants using an integrated weed management strategy. SGP weed management and treatment actions on the BNF would need to conform to methodologies authorized in this ROD.

3.10.2.10 South Fork Salmon River Subbasin Noxious and Invasive Weed Management Program EIS and RODs

The South Fork Salmon River (SFSR) Subbasin Noxious and Invasive Weed Management Program EIS (Forest Service 2010b) was developed to evaluate and disclose the impacts of alternative management strategies to manage noxious and invasive weeds in the SFSR subbasin outside the Frank Church-River of No Return Wilderness on the PNF and BNF. The PNF and BNF each issued separate RODs for this EIS for portions of the project on lands within their respective jurisdictions (Forest Service 2007a, 2010c). Both Forests selected the preferred alternative (Alternative C), though the BNF ROD included modifications to the preferred alternative. SGP weed management and treatment actions within this planning area would need to conform to methodologies authorized in these RODs.

In accordance with the Federal Noxious Weed Act, the SFSR Subbasin Noxious and Invasive Weed Management Program was implemented by the PNF in 2007, and BNF in 2010. The purpose of this program is to:

- Develop criteria to prioritize weed species and treatment areas in the SFSR subbasin;
- Identify and treat existing priority weed infestations in the SFSR subbasin on the PNF and BNF using a variety of methods including herbicide application;
- Prevent or limit the introduction and establishment of identified weed species, particularly in areas at high risk due to recent fires; and

- Restore and maintain native plant communities and protect the natural functioning condition and native biodiversity of ecosystems in the SFSR subbasin.

3.10.2.11 Idaho Invasive Species Act of 2008

The Idaho Invasive Species Act of 2008 provides policy direction, planning, and authority to combat invasive species infestations throughout the state and to prevent the introduction of new species that may be harmful. This act defines the different classes of weeds and sets priority for their containment and eradication.

3.10.2.12 Idaho Statute Title 22, Chapter 24 (22-2407)

Idaho Statute Title 22, Chapter 24 (22-2407) outlines landowner and citizen duties for controlling and treating noxious weeds on public and private land.

3.10.2.13 Idaho Department of Agriculture Administrative Rule 02.06.09

The Idaho Department of Agriculture Administrative Rule 02.06.09 governs the designation of invasive species, inspection, permitting, decontamination, recordkeeping, and enforcement of regulated invasive species, including invasive plant species defined under the Idaho Plant Pest Act of 2002.

3.10.2.14 Valley County Regulations

Valley County administers noxious weed control and monitoring under Idaho Statute Title 22, Chapter 24 (22-2407).

3.10.2.15 Summary of Relevant Laws, Regulations, Policies, and Plans

Relevant laws, regulations, policies, and plans for each aspect of vegetation in this analysis are presented in **Table 3.10-1**.

Table 3.10-1 Summary of Relevant Laws, Regulations, Policies, and Plans

Vegetation Category	Relevant Law, Regulation, Policy, and/or Plan
Vegetation Communities - General	National Forest Management Act USDA Departmental Regulation 6500-4 (USDA 2008) Payette and Boise Forest Plans (Forest Service 2003, 2010a; various standards and guidelines)
Botanical Resources - Threatened, Endangered, Candidate, or Proposed Species	The ESA, 16 USC 35 Section 1531 et seq. 1988 FSM 2670, Threatened, Endangered, and Sensitive Plants and Animals USDA Departmental Regulation 6500-4 (USDA 2008) Payette and Boise Forest Plans (Forest Service 2003, 2010a; various standards and guidelines)
Botanical Resources - Forest Service Sensitive Species	FSM 2670, Threatened, Endangered, and Sensitive Plants and Animals USDA Departmental Regulation 6500-4 (USDA 2008) Payette and Boise Forest Plans (Forest Service 2003, 2010a; various standards and guidelines)
Botanical Resources - Forest Service Forest Watch Species	USDA Departmental Regulation 6500-4 (USDA 2008) Payette and Boise Forest Plans (Forest Service 2003, 2010a; Guideline MIOB08)
Non-Native Plants - Noxious Weeds	Federal Noxious Weed Act of 1974 (Public Law 93-629) (7 USC 2801 et seq.) EO 13112 FSM 2900, Invasive Species Management Sawtooth and Boise National Forests Invasive Species Project Final EIS (Forest Service 2019a) and ROD (Forest Service 2019b) South Fork Salmon River Subbasin Noxious and Invasive Weed Management Program EIS (Forest Service 2010b) and RODs (Forest Service 2007a, 2010c) Idaho Invasive Species Act of 2008 Idaho Statute Title 22, Chapter 24 (22-2407) Idaho Department of Agriculture Administrative Rule 02.06.09 Idaho Statute Title 22, Chapter 24 (22-2407) Payette and Boise Forest Plans (Forest Service 2003, 2010a; various standards and guidelines)
Non-Native Plants - Invasive Plants not Designated as Noxious	EO 13112 FSM 2900, Invasive Species Management Sawtooth and Boise National Forests Invasive Species Project Final EIS (Forest Service 2019a) and ROD (Forest Service 2019b) South Fork Salmon River Subbasin Noxious and Invasive Weed Management Program EIS (Forest Service 2010b) and RODs (Forest Service 2007a, 2010c) Idaho Invasive Species Act of 2008 Payette and Boise Forest Plans (Forest Service 2003, 2010a; various standards and guidelines)

Table Source: Compiled by AECOM from the various citations above

Table Notes:

EIS = Environmental Impact Statement.

ROD = Record of Decision.

3.10.3 Existing Conditions

This section describes existing conditions of vegetation communities, and botanical resources, and non-native plants in the analysis area. This summary is based on best available information from the Forest Service, Idaho Department of Fish and Game, and USFWS.

3.10.3.1 Vegetation Communities

This section presents the existing condition of vegetation communities in the analysis area on lands within and outside NFS boundaries.

3.10.3.1.1 Forested Potential Vegetation Groups in the Analysis Area within Forest Service-Managed Land

The Forest Service maps potential vegetation groups (PVGs) in the PNF and BNF and updates this information periodically (most recently in 2005 for the PNF and 2017 for the BNF). This mapping is available only for NFS lands. This discussion assumes that PVG mapping, which has been provided by the Forest Service, is adequate for estimating potential impacts to vegetation communities from the SGP as described in Section 4.10, Environmental Consequences Vegetation. Note that information in PVG mapping has not been verified on-the-ground within the analysis area. Approximately 341 acres (2 percent) of the analysis area occur in the Salmon-Challis National Forest (administered by the PNF); however, PVG data were not available for this area.

In Forest Service mapping, PVGs are forested habitat types that share similar environmental characteristics, site productivity, and disturbance regimes. PVGs are generally a description of the climax plant community that could be supported by a site, as determined by abiotic conditions such as climate, soil types, hydrological conditions, and topographical aspect. Understanding the potential climax vegetation (final stage in ecological succession) that an area could support is important for assessing how the SGP could impact the vegetation of an area over time. The extent (in acres) of PVGs in the analysis area is presented in **Table 3.10-2**. Maps of PVGs in the analysis area are shown in **Appendix H-1a**.

Mapping of existing vegetation also is performed by the Forest Service and updated periodically (most recently in 2016 for the PNF and 2017 for the BNF). The existing vegetation map layer can be used to describe seral-stage (intermediate ecological succession) plant community composition as it was at the time of the most recent mapping. Note that information in existing vegetation mapping has not been verified on-the-ground within the analysis area.

Table 3.10-2 Forested PVGs in the Analysis Area

PVG Number	PVG name	Total Acres in the Analysis Area[1]	Undisturbed Acres in the Analysis Area[2]	Previously Disturbed Acres in the Analysis Area[2,3]	Acres of Existing Vegetation Communities in the PVG[2,4,5]
1	Dry Ponderosa Pine/ Xeric Douglas-fir	140.1 (0.9%)	140.0 (100%)	-	Douglas-fir: 72.7 acres (51.9%) Douglas-fir/Ponderosa Pine: 26.2 acres (18.7%) Lodgepole Pine: 11.4 acres (8.1%) Ponderosa Pine: 15.2 acres (10.9%) Riparian Herblands: 0.6 acre (0.5%) All others: 14.0 acres (10.0%)
2	Warm, Dry Douglas-fir/Moist Ponderosa Pine	1,859.3 (12.1%)	1,854.8 (99.8%)	4.6 (0.2%)	Burned Herblands: 131.9 acres (7.1%) Douglas-fir: 276.2 acres (14.9%) Douglas-fir/Ponderosa Pine: 270.5 acres (14.5%) Lodgepole Pine: 531.3 acres (28.6%) Ponderosa Pine: 364.9 acres (19.6%) Riparian Herblands: 6.1 acres (0.3%) Riparian Shrublands/Deciduous Forests: 15.8 acres (0.8%) All others: 262.7 acres (14.1%)
3	Cool, Moist Douglas-fir	62.6 (0.4%)	62.6 (100%)	-	Aspen: 2.1 acres (3.3%) Burned Herblands: 17.1 acres (27.3%) Burned Sparse Vegetation: 6.8 acres (10.9%) Douglas-fir: 4.0 acres (6.4%) Ponderosa Pine: 27.9 acres (44.6%) Riparian Herblands: 0.6 acre (1.0%) Riparian Shrublands/Deciduous Forests: 1.1 acres (1.8%) All others: 2.9 acres (4.7%)

PVG Number	PVG name	Total Acres in the Analysis Area[1]	Undisturbed Acres in the Analysis Area[2]	Previously Disturbed Acres in the Analysis Area[2,3]	Acres of Existing Vegetation Communities in the PVG[2,4,5]
4	Cool, Dry Douglas-fir	1,296.9 (8.4%)	1,248.2 (96.2%)	48.8 (3.8%)	Aspen: 1.6 acres (0.1%) Burned Herblands: 76.3 acres (5.9%) Douglas-fir: 300.0 acres (23.1%) Douglas-fir/Ponderosa Pine: 136.1 acres (10.5%) Lodgepole Pine: 404.1 acres (31.2%) Ponderosa Pine: 124.6 acres (9.6%) Riparian Herblands: 6.0 acres (0.5%) Riparian Shrubland/Deciduous Forests: 22.0 acres (1.7%) All others: 226.2 acres (17.4%)
5	Dry Grand Fir	444.6 (2.9%)	444.6 (100%)	-	Aspen: 0.4 acre (0.1%) Burned Herblands: 29.1 acres (6.5%) Douglas-fir: 45.6 acres (10.2%) Douglas-fir/Ponderosa: 24.1 acres (5.4%) Lodgepole Pine: 60.0 acres (13.5%) Ponderosa Pine: 225.0 acres (50.6%) Riparian Herblands: 3.8 acres (0.9%) Riparian Shrubland/Deciduous Forests: 6.5 acres (1.5%) All others: 50.3 acres (11.3%)
6	Moist Grand Fir	357.3 (2.3%)	357.3 (100%)	-	Aspen: 0.8 acre (0.2%) Burned Herblands: 25.4 acres (7.1%) Douglas-fir: 30.7 acres (8.6%) Douglas-fir/Ponderosa: 23.6 acres (6.6%) Lodgepole Pine: 74.6 acres (20.9%) Ponderosa Pine: 143.5 acres (40.2%) Riparian Herblands: 2.5 acres (0.7%) Riparian Shrubland/Deciduous Forests: 9.3 acres (2.6%) All others: 47.0 acres (13.1%)

PVG Number	PVG name	Total Acres in the Analysis Area[1]	Undisturbed Acres in the Analysis Area[2]	Previously Disturbed Acres in the Analysis Area[2,3]	Acres of Existing Vegetation Communities in the PVG[2,4,5]
7	Warm, Dry Subalpine Fir	4,393.0 (28.6%)	4,144.3 (94.3%)	248.7 (5.7%)	Aspen: 0.3 acre (<0.1%) Burned Herblands: 1,005.2 acres (22.9%) Burned Sparse Vegetation: 860.5 acres (19.6%) Douglas-fir: 227.0 acres (5.2%) Lodgepole Pine: 1,202.7 acres (27.4%) Riparian Herblands: 38.7 acres (0.9%) Riparian Shrubland/Deciduous Forests: 46.1 acres (1.0%) Subalpine Fir: 585.3 acres (13.3%) Whitebark Pine: 50.7 acres (1.2%) All others: 376.6 acres (8.6%)
8	Warm, Moist Subalpine Fir	-	-	-	None
9	Hydric Subalpine Fir	334.1 (2.2%)	329.9 (98.8%)	4.2 (1.2%)	Burned Herblands: 40.8 acres (12.2%) Lodgepole Pine: 187.0 acres (56.0%) Riparian Herblands: 25.7 acres (7.7%) Riparian Shrubland/Deciduous Tree: 28.1 acres (8.4%) Whitebark Pine: 0.1 acre (<0.1%) All others: 52.4 acres (15.7%)
10	Persistent Lodgepole Pine	4,453.4 (29.0%)	4,355.2 (97.8%)	98.2 (2.2%)	Aspen: 1.3 acres (<0.1%) Burned Herblands: 1,009.0 acres (22.7%) Burned Sparse Vegetation: 559.5 acres (12.6%) Douglas-fir: 525.1 acres (11.8%) Lodgepole Pine: 1,422.5 acres (31.9%) Riparian Herblands: 64.0 acres (1.4%) Riparian Shrubland/Deciduous Forests: 50.4 acres (1.1%) Subalpine Fir: 399.4 acres (9.0%) Whitebark Pine: 37.9 acres (0.9%) All others: 384.2 acres (8.6%)

PVG Number	PVG name	Total Acres in the Analysis Area[1]	Undisturbed Acres in the Analysis Area[2]	Previously Disturbed Acres in the Analysis Area[2,3]	Acres of Existing Vegetation Communities in the PVG[2,4,5]
11	High Elevation Subalpine Fir (with Whitebark Pine)	366.6 (2.4%)	366.6 (100%)	-	Burned Herblands: 43.4 acres (11.8%) Burned Sparse Vegetation: 174.2 acres (47.5%) Lodgepole Pine: 24.8 acres (6.8%) Riparian Herblands: 6.2 acres (1.7%) Subalpine Fir: 69.7 acres (19.0%) Whitebark Pine: 20.4 acres (5.6%) All others: 27.9 acres (7.6%)
97	Water	35.1 (0.2%)	2.4 (6.9%)	32.7 (93.1%)	Not vegetation; analysis of impacts to PVGs in Chapter 4 (Section 4.10) are not performed on this category
98	Rock and Barren	495.4 (3.2%)	119.1 (24.0%)	376.4 (76.0%)	Not vegetation; analysis of impacts to PVGs in Chapter 4 (Section 4.10) are not performed on this category
99	Non-Forest	1,118.6 (7.3%)	792.3 (70.8%)	326.3 (29.2%)	Refer to discussion in Section 3.10.3.1.2 and to **Table 3.10-3** for description of these areas.
-	**TOTALS[5]**	**15,357.1 (100%)**	**14,217.3 (92.6%)**	**1,139.8 (7.4%)**	-

Table Source: AECOM 2020a; Forest Service 2005, 2016a, 2017a,b; Midas Gold 2019

Table Notes:

1 Percentages in this column represent percent of the total analysis area acreage where PVG data are available.

2 Percentages in this column represent percent of the total acres for this PVG.

3 Disturbed areas are those impacted by historical mine-related activities.

4 Acreages are presented in this column for all existing vegetation types that compose greater than 5% of total cover in a PVG, as well as total acres for uncommon vegetation types (aspen, riparian herblands, riparian shrublands/deciduous forests, whitebark pine mix) of any percentage cover.

5 Due to rounding, numbers presented in this table may not sum precisely to the totals provided.

Maps of PVGs in the analysis area are shown in **Appendix H-1a**.

Existing vegetation mapping typically describes the current dominant vegetative cover or species occupying a site and is frequently updated to reflect vegetation changes due to disturbance such as fire, insects, and disease. In general, existing vegetation types in the analysis area are coniferous forests typical of high mountain regions in Idaho and the inland northwestern U.S. The most common existing vegetation types in the analysis area are lodgepole pine (*Pinus contorta*) forests, subalpine fir (*Abies lasiocarpa*) forests, Douglas-fir (*Pseudotsuga menziesii*) forests, ponderosa pine (*Pinus ponderosa*) forests, and Engelmann's spruce (*Picea engelmannii*) forests. Other vegetation types include grand fir (*Abies grandis*) forests, aspen (*Populus tremuloides*) forests, and whitebark pine (*Pinus albicaulus*) forests. Fires routinely occur in the analysis area and surrounding forests, and as such, much of the analysis area and vicinity is now mapped as burned herblands (grasses and forbs), burned sparse vegetation, and burned forest shrublands reflective of earlier seral stages. Acres of existing vegetation communities within PVGs in the analysis area are presented in **Table 3.10-2**.

A mature limber pine (*Pinus flexilis*) stand occurs in the area of the proposed mine site (refer to 2019 Whitebark Pine Survey Report [Tetra Tech 2020] for a map of this location). Mature limber pine trees are uncommon in the surrounding forests and this may be the only documented population of this species in the PNF (Mancuso 2016). This stand overlaps various PVGs mapped as PVG 7 - Cool Dry Subalpine Fir (overlap of 8.8 acres), PVG 10 - Persistent Lodgepole Pine (overlap of 25.8 acres), PVG 11 - High Elevation Subalpine Fir (overlap of 0.7 acre), and areas not successional to forests (overlap of 7.8 acres).

The following descriptions of PVGs in the analysis area within Forest Service-administered lands are derived from Payette and Boise Forest Plans (Forest Service 2010a, 2003).

3.10.3.1.1.1 Dry Ponderosa Pine/Xeric Douglas-fir (PVG 1)

This group represents the warm, dry extreme of the forested zone. Typically, this group occurs at lower timberline down to 3,000 feet and up to 6,500 feet on steep, dry, south-facing slopes. Ponderosa pine is a dominant cover type that historically persisted due to frequent nonlethal fire. Under such conditions, open park-like stands of large, old ponderosa pine dominated the area, with occasional Douglas-fir, particularly at higher elevations. Understories are sparse and consist of low to moderately dense perennial grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*). In some areas, shrubs such as mountain snowberry (*Symphoricarpos oreophilus*) and antelope bitterbrush (*Purshia tridentata*) dominate.

3.10.3.1.1.2 Warm, Dry Douglas-fir/Moist Ponderosa Pine (PVG 2)

This group represents warm, mild environments at low to middle elevations, but may extend upward to 6,500 feet on dry, southerly slopes. Ponderosa pine, particularly at lower elevations, or large ponderosa pine mixed with smaller size classes of Douglas-fir, are the dominant cover types in this group. Historically, frequent nonlethal fire maintained stands of large, park-like ponderosa pine. Douglas-fir would occur on moister aspects, particularly at higher elevations. Understories are mostly graminoids such as pinegrass (*Calamagrostis rubescens*) and elk sedge (*Carex geyeri*), with a cover of shrubs such as common snowberry (*Symphoricarpos albus*), white spirea (*Spiraea betulifolia*), and mallow ninebark (*Physocarpus malvaceus*).

3.10.3.1.1.3 Cool, Moist Douglas-fir (PVG 3)

This group represents the cooler extremes in the Douglas-fir zone. The group can extend from 6,800 feet down to 4,800 feet following cold air. Adjacent sites are often subalpine fir, with some areas supporting grand fir. Ponderosa pine occurs as a major seral species only in the warmest extremes of the group. In cold air areas, particularly where cold air accumulates to form frost pockets, lodgepole pine may dominate. In some areas, Douglas-fir is the only species capable of occupying the site. The conifer cover types that historically dominated are due to a combination of several factors including fire frequency and intensity, elevation, and topography. Understories in this group are primarily shrub species including mountain maple (*Acer spicatum*), mountain ash (*Sorbus* sp.), and blue huckleberry (*Vaccinium globure*). Several other species, including scouler willow (*Salix scouleriana*), thimbleberry (*Rubus parviflorus*), and chokecherry (*Prunus virginiana*) may occur from disturbance, depending on its severity. Historical fire regimes[1] were mixed (generally mixed1 where ponderosa pine occurs and mixed2 where other species dominate), creating a diversity of vegetative combinations.

3.10.3.1.1.4 Cool, Dry Douglas-fir (PVG 4)

Douglas-fir is the only species that occurs throughout the entire range of the group. Lodgepole pine may be found in areas with cold air. Quaking aspen also is a common early seral species. Understories are sparse due to the cool, dry environment, and often support pinegrass and elk sedge. Understories of low shrubs, such as white spirea, common snowberry, Oregon grape (*Berberis repens*), and mallow ninebark occur in some areas that represent slightly different environments across the group. The historical fire regime was primarily mixed1 to mixed2, depending on the fuels present at the time of ignition. Organic matter accumulates slowly in this group; so fire effects depend on the interval between fires, stand density and mortality, and other factors. This group may be found in minor amounts at higher elevations in the Douglas-fir

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[1] Fire regimes describe the types of fire that generally occur in an ecosystem and are based on Fire Regime Condition Classes as defined in the Forest Service National Fire Plan (Schmidt et al. 2002). Four fire regimes are defined for PVGs in the PNF and BNF: nonlethal, mixed1, mixed2, and lethal. Fire regimes are used to describe the types of effects that may result from burning. The mortality, patch sizes, consumption of organics, and other changes that result from nonlethal fire are much more subtle and of smaller scale than the changes that occur from lethal fire. Mixed fire regimes (mixed1 and mixed2) are intermediate to the nonlethal and lethal. Fire regimes are described as fire frequency (the average number of years between fires) and the severity of the fire on the dominant overstory vegetation. The frequency and lethality of these fire regimes are as follows:

- Nonlethal — 0-35-year frequency, low severity
- Mixed1 and mixed2 — 35-100+ year frequency, mixed severity
- Lethal — 200+ year frequency, stand replacement severity

Note: Frequency is the average number of years between fires, and severity is the effect of the fire on the dominant overstory vegetation. Low severity fires are fires in which more than 70 percent of the basal area and more than 90 percent of the canopy cover of the overstory vegetation survives (Morgan et al. 1996). Mixed severity fires are fires that result in moderate effects on the overstory, cause mixed mortality, and produce irregular spatial mosaics resulting from different fire severities (Smith and Fischer 1997). Stand replacement severity fires consume or kill more than 80 percent of the basal area or more than 90 percent of the overstory canopy cover (Morgan et al. 1996).

zone in other parts of the PNF and BNF. In these cases, it is usually found above 6,000 feet on sites that are too cool to support ponderosa pine. Where it is common, it occurs at lower elevations in areas that are beyond the extent of ponderosa pine.

3.10.3.1.1.5 Dry Grand Fir (PVG 5)

The Dry Grand Fir Group is found throughout the distribution of grand fir. It ranges from 4,300 to 6,400 feet in elevation, often on drier upper slopes and ridges. Ponderosa pine and Douglas-fir are common cover types that appear to have been maintained by fire regimes that were historically nonlethal to mixed1. In many areas this group may have resembled PVG 1 and PVG 2, with open park-like stands of large ponderosa pine. Mixed species stands were likely restricted to small micro-sites that burned less frequently. Understories are similar to PVG 2 in that pinegrass, elk sedge, and white spirea are common.

3.10.3.1.1.6 Moist Grand Fir (PVG 6)

This group ranges in elevation from 3,400 to 6,500 feet and represents more moist environments in the grand fir zone. It often occurs adjacent to dry grand fir, and the two may intermix with each other, depending on topography. Ponderosa pine is common at the drier extremes of the group, and lodgepole pine occurs in colder areas. Western larch (*Larix occidentalis*) also may be present as an early seral species. Cover types of Douglas-fir and Engelmann’s spruce also occur in this group. Understories in this group are shrubby and include blue huckleberry, mountain maple, mountain ash, mallow ninebark, and occasionally pachistima (*Paxistima myrsinites*). A conspicuous herb layer also is common, particularly following disturbance. Historical fire regimes were mixed, ranging from mixed1 to mixed2, in part due to the wide environment represented by this group. Where ponderosa pine was maintained as a common seral species, it appears that fires were more often mixed1 because ponderosa pine produces a heavy seed that generally disperses only short distances. In other areas where western larch or Douglas-fir were maintained as common seral species, mixed2 fire may have been more common. Douglas-fir and larch produce lighter seed that can disperse much farther than ponderosa pine.

3.10.3.1.1.7 Warm, Dry Subalpine Fir (PVG 7)

This group is common in the PNF and BNF. It represents warmer, drier environments in the subalpine fir zone. Elevations range from 4,800 to 7,500 feet. At lower elevations, this group is found on steep, north-to-east aspects, but shifts to south-to-west aspects as elevation increases. Adjacent sites at lower elevations are Douglas-fir or grand fir, and these commonly intermix where topography controls cold air flow. Douglas-fir is the most common cover type throughout the group. Ponderosa pine may be found at the warmest extremes, particularly where this group grades into the Douglas-fir or grand fir zone. Lodgepole pine or Engelmann’s spruce may occur at cool, moist extremes, but these cover types rarely dominate. Understories are commonly shrubby and include mountain maple, mountain ash, serviceberry, and scouler willow. Historical fire regimes were generally mixed2, though mixed1 fires may have occurred where ponderosa pine was maintained.

3.10.3.1.1.8 Hydric Subalpine Fir (PVG 9)

Seasonally high water tables control this group, and the extent may be small in some areas depending on the presence of these conditions. Elevations range from 9,000 feet to as low as 4,500 feet in frost pockets and along cold air drainages. This group most commonly occurs on wet toe slopes, stream terraces, seep areas, and old bogs. Cover types are lodgepole pine, followed by Engelmann's spruce and subalpine fir. Early seral conditions usually support lodgepole pine because this species can tolerate intermittent high water tables and cold air that often accumulates. In severe frost-prone areas, lodgepole pine can persist for long periods. In other areas with better cold air drainage, Engelmann's spruce and subalpine fir rapidly establish under the lodgepole pine. Understories in this group are primarily dominated by herbs and grasses that require the seasonal influence of a high water table. Shrubs are sparse, though Labrador tea (*Ledum glandulosum*) can dominate some sites. Historically, fire was lethal in this group. Like PVG 8, ignitions more likely occurred on adjacent drier slopes, and burning in this group likely depended on weather conditions before and at the time of the ignition.

3.10.3.1.1.9 Persistent Lodgepole Pine (PVG 10)

This group is common throughout the subalpine fir zone. It represents cold, dry subalpine fir sites that range in elevation from over 9,200 feet down to 5,200 feet in frost-pockets. Lodgepole pine is the dominant cover type, though small amounts of other species may occasionally occur. Understories can be sparse. Generally, grasses and scattered forbs are the most common understory components. Shrubs are sparse and consist mainly of low-growing huckleberries, including dwarf huckleberry (*Vaccinium caespitosum*) and grouse whortleberry (*Vaccinium scoparium*).

Historically, this group experienced lethal fire, though nonlethal fires may have occurred during stand development. Lodgepole pine is more often non-serotinous in western portions of the PNF and BNF and appears to become more serotinous moving easterly. Lodgepole pine may reproduce in areas that experience nonlethal fires. The result is more vertical stand diversity in some areas than is often found where lodgepole pine is mostly serotinous. Over time, the combinations of these low-intensity events, subsequent reproduction, and mountain pine beetle mortality would have created fuel conditions that allowed lethal fires to occur under the right weather conditions.

3.10.3.1.1.10 High Elevation Subalpine Fir (with Whitebark Pine) (PVG 11)

This group occurs at the highest elevations of the subalpine fir zone and generally represents the upper timberline conditions. It often grades into krummholz or alpine communities. Whitebark pine is a major seral species in this group. Engelmann's spruce and subalpine fir are the climax co-dominates. In some areas, whitebark pine serves as a cover for Engelmann's spruce-subalpine fir establishment. Understories are primarily forbs and grasses tolerant of freezing temperatures that can occur any time during the growing season. Shrubs are sparse due to the cold, harsh conditions. Historically, the fire regime in this group is characterized as mixed2, though the effects of fires were highly variable. Ignitions are common due to the high elevation; however, fuel conditions were historically sparse due to the cold growing conditions and shallow soils. Therefore, fire effects were patchy. Fire regimes are mixed2 with whitebark pine being a major seral component.

3.10.3.1.2 NON-FORESTED POTENTIAL VEGETATION GROUPS IN THE ANALYSIS AREA WITHIN FOREST SERVICE-MANAGED LAND

PVG mapping has identified some acreages in the analysis area as not being successional to forests. Acreages of existing vegetation mapping within these areas are presented in **Table 3.10-3**. As PVG mapping and existing vegetation mapping are performed using different processes and have different objectives, forest vegetation types (as identified in existing vegetation mapping) can occur within areas identified as not successional to forests in PVG mapping.

Table 3.10-3 Acres of Existing Vegetation Types in Areas Identified as Not Successional to Forested PVGs in the Analysis Area within Forest Service-administered Land

Existing Vegetation Type	Acres[1]
Agriculture	4.0 (0.4%)
Aspen	2.9 (0.3%)
Burned Forest Shrublands	38.7 (3.5%)
Burned Herblands	72.1 (6.4%)
Burned Sparse Vegetation	43.0 (3.8%)
Developed	190.7 (17.0%)
Douglas-fir	176.8 (15.8%)
Douglas-fir/Lodgepole Pine	17.9 (1.6%)
Douglas-fir/Ponderosa Pine	25.1 (2.2%)
Engelmann's Spruce	4.4 (0.4%)
Forblands	11.8 (1.1%)
Forest Shrublands	29.3 (2.6%)
Grasslands	35.0 (3.1%)
Lodgepole Pine	212.4 (19.0%)
Mountain Big Sagebrush	12.0 (1.1%)
Mountain Shrubland	2.9 (0.3%)
Ponderosa Pine	66.5 (5.9%)
Riparian Herblands	36.8 (3.3%)
Riparian Shrublands/Deciduous Forests	55.7 (5.0%)
Sparse Vegetation	27.9 (2.5%)
Subalpine Fir	26.0 (2.3%)
Water	16.9 (1.5%)

Existing Vegetation Type	Acres[1]
Whitebark Pine	3.6 (0.3%)
No existing vegetation mapped[2]	6.3 (0.6%)
TOTAL[3]	**1,118.6**

Table Source: AECOM 2020a; Forest Service 2005, 2016a, 2017a,b

1 Percentages in this column represent percent of the total acres.

2 Vegetation community impacts analyses in Chapter 4 (Section 4.10) are performed solely on areas where vegetation is mapped.

3 Due to rounding, numbers presented in this table may not sum precisely to the total provided.

3.10.3.1.3 VEGETATION COMMUNITIES IN THE ANALYSIS AREA OUTSIDE FOREST SERVICE-MANAGED LAND

As PVG mapping does not extend outside the boundaries of the PNF or BNF, LANDFIRE vegetation mapping was used to describe vegetation outside Forest Service-administered lands. Approximately 3,091 acres (16 percent) of land in the vegetation analysis area occurs on lands not administered by the Forest Service. Acres of LANDFIRE vegetation communities (excluding developed or urban land uses) in the analysis area outside Forest Service-administered lands are presented in **Table 3.10-4**. Descriptions of these vegetation communities are presented in **Appendix H-5.** Maps of these vegetation communities are presented in **Appendix H-1b**.

Table 3.10-4 Vegetation Communities in the Analysis Area outside Forest Service-administered Land

LANDFIRE Vegetation System Group	LANDFIRE Vegetation Class Name	Acres[1]
Conifer	Dry-mesic Montane Douglas-fir Forest	120.8 (3.9%)
Conifer	Mesic Montane Douglas-fir Forest	12.9 (0.4%)
Conifer	Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	22.4 (0.7%)
Conifer	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	235.4 (7.6%)
Conifer	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	132.1 (4.3%)
Conifer	Rocky Mountain Lodgepole Pine Forest	56.9 (1.8%)
Conifer	Rocky Mountain Poor-Site Lodgepole Pine Forest	20.8 (0.7%)
Conifer	Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	8.9 (0.3%)
Conifer	Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland	0.9 (<0.1%)
Conifer	Subalpine Douglas-fir Forest	45.4 (1.5%)
Conifer	Xeric Montane Douglas-fir Forest	0.7 (<0.1%)
Conifer-Hardwood	Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland	0.5 (<0.1%)

LANDFIRE Vegetation System Group	LANDFIRE Vegetation Class Name	Acres[1]
Exotic Herbaceous	Introduced Upland Vegetation-Annual Grassland	0.2 (<0.1%)
Exotic Herbaceous	Introduced Upland Vegetation-Perennial Grassland and Forbland	80.1 (2.6%)
Grassland	Columbia Basin Palouse Prairie	0.2 (<0.1%)
Grassland	Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland	171.1 (5.5%)
Grassland	Northern Rocky Mountain Subalpine-Upper Montane Grassland	10.7 (0.3%)
Grassland	Rocky Mountain Subalpine-Montane Mesic Meadow	126.6 (4.1%)
Riparian	Inter-Mountain Basins Montane Riparian Forest and Woodland	<0.1 (<0.1%)
Riparian	Northern Rocky Mountain Conifer Swamp	0.9 (<0.1%)
Riparian	Rocky Mountain Montane Riparian Forest and Woodland	134.7 (4.4%)
Riparian	Rocky Mountain Subalpine/Upper Montane Riparian Forest and Woodland	51.4 (1.7%)
Riparian	Rocky Mountain Wetland-Herbaceous	90.7 (2.9%)
Shrubland	*Artemisia tridentata* ssp. *vaseyana* Shrubland Alliance	293.9 (9.5%)
Shrubland	Columbia Plateau Low Sagebrush Steppe	15.5 (0.5%)
Shrubland	Inter-Mountain Basins Big Sagebrush Shrubland	1.1 (<0.1%)
Shrubland	Inter-Mountain Basins Big Sagebrush Steppe	15.8 (0.5%)
Shrubland	Inter-Mountain Basins Montane Sagebrush Steppe	51.2 (1.7%)
Shrubland	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	16.5 (0.5%)
Shrubland	Northern Rocky Mountain Subalpine Deciduous Shrubland	63.8 (2.1%)
Sparsely Vegetated	Inter-Mountain Basins Sparsely Vegetated Systems	9.1 (0.3%)
Sparsely Vegetated	Rocky Mountain Alpine/Montane Sparsely Vegetated Systems	0.2 (<0.1%)
Open Water	Open Water	56.9 (1.8%)
Agricultural, Developed	All others[2]	1,242.7 (40.2%)
-	**TOTAL[3]**	**3,091.1**

Table Source: AECOM 2020a; Table prepared using LANDFIRE vegetation type mapping spatial data (LANDFIRE 2009) clipped to the analysis area

Table Notes:

1 Percentages in this column represent percent of the total acres.

2 Vegetation community impacts analyses in Chapter 4 (Section 4.10) are performed solely on non-agriculture and non-developed vegetation communities.

3 Due to rounding, numbers presented in this table may not sum precisely to the total provided.

3.10.3.1.4 Vegetation Community Trends

From 1989 to 1998, an average of 187 fires occurred annually on the PNF with 93 percent of them caused by lightning (Forest Service 2003). Nearly 32 percent of the PNF has been affected by fire since 1989, with a substantial portion burning so intensely that large-sized timber stands have shifted to the grass/forb/shrub/seedling size class (Forest Service 2003). Historically, areas with high fuel loading on the PNF were smaller and more isolated; however, fuel loading has increased and areas with moderate to high fuels are currently larger and more continuous (Forest Service 2003). Between 1990 and 2010, over 14 percent of the BNF planning unit land base was burned from wildfire, and even though acres burned by wildfire have been increasing over the past few decades, the amount of area burned is still well below historical levels (Forest Service 2010a).

The effects of fire on the landscape vary depending on weather, fuel loadings, and vegetative community type (Forest Service 2003, 2010c). Historically, wildfires throughout the PNF and BNF ranged from ground fires to stand-replacing fires, depending on the vegetative community (Forest Service 2003, 2010c). Some recent wildfires have created more homogeneous landscapes than those that typically occurred within historical fire regimes (Forest Service 2003, 2010c). However, some recent fires in the PNF and BNF may have been more similar to historical fires in that they burned through vegetative types that historically burned infrequently, resulting in a diversity of vegetative communities and a variety of landscape mosaics (Forest Service 2003, 2010c).

Additionally, various factors including altered species compositions have increased the susceptibility of some plant communities to large-scale infestations of insects and pathogens, which has resulted in greater numbers of standing dead or dying trees and increases the fuel loading in these areas (Forest Service 2003).

Surface soils in the proposed mine site area are influenced by trace metals as a byproduct of historic mining operations, with concentrations of antimony, arsenic, mercury, and silver in soils adjacent to the proposed mine site being greater than screening level phytotoxicity criteria (Tetra Tech 2019). Total arsenic was identified as having the greatest potential to cause phytotoxicity in plants growing at or near the proposed mine site. However, soil analysis and visual observations of plant growth in reclaimed historic mine sites adjacent to the proposed mine site suggest that plants in the area can withstand higher concentrations of trace metals than are commonly accepted as upper limits for supporting vegetation (Tetra Tech 2019).

Gradual changes in the distribution and abundance of dominant plant species and short-term impacts on vegetation structure and age classes are expected as a result of rising temperatures and longer and more frequent droughts associated with climate change (discussed in Section 3.4, Climate Change, in Section 3.4.3.3.6, Vegetation).

3.10.3.1.5 Desired Conditions for Vegetation

Desired Conditions relating to vegetation communities in the Payette Forest Plan and Boise Forest Plan are as follows:

- **Both Forest Plans:** Forested vegetation reflects a combination of successional development, disturbance regimes, and management activities. Forested lands exhibit variable patterns of size classes, densities, structural stages, and species composition. Seral tree species such as ponderosa pine, Douglas-fir, aspen, and whitebark pine have increasing species composition in areas where fire and mechanical vegetation treatments are the primary tools. Snags and coarse woody debris are present in sufficient quantities to provide for habitat diversity and long-term soil productivity.

- **Both Forest Plans:** Grasslands and shrublands exhibit variable patterns of multiple-aged shrubs, grasses, and forbs. Shrublands are found in mosaics of canopy closures across the landscape, reflecting a combination of successional development, disturbance regimes and management activities. Some mid- to high-elevation grasslands are primarily meadow complexes that are dominated by sedges, rushes, grasses, and forbs.
- **Payette Forest Plan only:** Where vegetation development is dominated by plant succession, climax species composition is increasing, canopy cover densities are moderate to high, and late successional structure develops.
- **Boise Forest Plan only:** In areas where vegetation development evolves primarily as a result of plant succession rather than disturbance, late-seral/climax species composition and moderate to high canopy densities will increase.

3.10.3.2 Botanical Resources

The terms botanical resources or special status plants are generally used to denote species that are considered sufficiently rare that they require special consideration and/or protection by the federal and/or state governments.

For the purposes of this EIS, botanical resources or special status plant species are those that are:

- Listed as threatened or endangered under the ESA, as amended (16 USC 35 Section 1531 et seq. 1988);
- Identified as candidate or proposed for ESA listing;
- Designated as sensitive by the Forest Service; and/or
- Identified as forest watch plant species in the Payette Forest Plan (Forest Service 2003) and/or Boise Forest Plan (Forest Service 2010a).

Sensitive species are defined in FSM 2670 as “plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by:

a. Significant current or predicted downward trends in population numbers or density.
b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.”

Forest watch species are those that are confirmed to occur in the planning area for a Forest and are listed as S1, S2, or S3 at the state level but may not be on the Forest Service regional sensitive species list. Impacts to forest watch species are addressed in this EIS in adherence to Forest Service Guideline MIOB08 (Forest Service 2003, 2010a).

Common names for special status plants in this document follow those in the most recent Forest Service Region 4 Sensitive Species list (Forest Service 2016b) and rare plant lists for the PNF (Forest Service no date) and BNF (Forest Service 2015).

Potential habitat modeling for special status plants in the analysis area was completed to supplement existing species location information. Potential habitat was modeled for whitebark pine and 29 additional Sensitive or Forest Watch species in the PNF and BNF; modeling protocols and results are documented in Stibnite Gold Project EIS Technical Report: Special Status Plant Potential Habitat Modeling Report (AECOM 2020b). Section 3.10.3.2.1 presents information on whitebark pine in the analysis area, Section 3.10.3.2.2.1 presents information on the six Sensitive and/or Forest Watch plant species known to occur in the analysis area, and Section 3.10.3.2.2.2 presents information on the 29 Sensitive and/or Forest Watch plant species besides whitebark pine for which potential habitat modeling was performed.

3.10.3.2.1 ENDANGERED SPECIES ACT THREATENED, ENDANGERED, CANDIDATE, AND PROPOSED SPECIES

There are no federally threatened or endangered plant species documented or suspected in proximity to the analysis area. Two federally listed threatened species, Ute ladies'-tresses orchid (*Spiranthes diluvialis*) and slickspot peppergrass (*Lepidium papilliferum*), are suspected to occur in the BNF; however, neither have been documented in proximity to the analysis area. There are no proposed species documented or suspected in proximity to the analysis area.

Whitebark pine, a candidate species without proposed or designated critical habitat, is found in the analysis area (HDR, Inc. [HDR] 2017; Tetra Tech 2020; USFWS 2019). Whitebark pine is a five-needled coniferous tree typically found in cold, windy, high-elevation or high-latitude sites in western North America, usually on steep slopes at alpine tree lines and in subalpine areas (Arno and Hoff 1989; Bureau of Land Management 2016; USFWS 2017). In moist mountain ranges, whitebark pine is most abundant on warm, dry exposures; but in semiarid ranges, it becomes prevalent on cool exposures and moist sites (Arno and Hoff 1989). It ranges from west-central British Columbia east to west-central Alberta and south to central Idaho, southwestern Wyoming, and southern California (NatureServe 2020a). Its distribution is split into two broad sections, one following the Coast and Cascade ranges of the Sierra Nevada, and the other following the northern Rocky Mountains, with scattered occurrences between the two sections in Great Basin regions of eastern Washington and Oregon and northern Nevada (NatureServe 2020a).

Whitebark pine is considered an important or keystone species in the ecosystems where it is found due to its function as habitat and food for wildlife, its ability to colonize areas after fire and other disturbances, its ability to survive on harsh, high-elevation droughty sites, and its function in regulating snowmelt and reducing soil erosion (Keane et al. 2017). Whitebark pine is a long-lived tree, commonly living over 400 years. Whitebark pine populations are declining in North America due to historical and current mountain pine beetle (*Dendroctonus ponderosae*) outbreaks, fire exclusion management policies, and the white pine blister rust disease, which is caused by the introduced pathogen white pine blister rust (*Cronartium ribicola*)

(Keane et al. 2017). Climate change also is predicted to negatively affect whitebark pine as a result of warming temperatures and major shifts to disturbance regimes (Keane et al. 2017).

Special status plant surveys in which whitebark pine was among the targeted species were performed in 2012, 2013, and 2014 in portions of the analysis area (HDR 2017). These surveys documented whitebark pine at the proposed mine site and along Burnt Log Road (National Forest System Road [FR] 447) and several existing roads, including Horse Heaven Road (FR 416w) and Meadow Creek Lookout Road (FR 51290), along the existing Old Thunder Mountain Road (FR 440), and within the proposed transmission line corridor between Johnson Creek Road (County Road [CR] 10-413) and the proposed mine site (HDR 2017).

Forest Service botanists determined that the 2012, 2013, and 2014 whitebark pine surveys were not conducted throughout the extent of suitable habitat in the SGP footprint and data were not collected in a manner that would be useful for a comprehensive and meaningful effects analysis for this species. As such, Forest Service botanists requested that known habitat parameters be used to model potential habitat for whitebark pine (AECOM 2019). Approximately 6,130 acres of potential habitat for this species were modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), proposed Burntlog Route, Meadow Creek Lookout Road (FR 51290), the transmission line right-of-way, and the proposed mine site. Figures showing the modeled potential habitat for these species can be found in **Appendix H-4**.

Surveys for whitebark pine using potential habitat modeling developed in 2019 were performed in spring, summer, and fall of 2019. The results of these surveys are reported in 2019 Whitebark Pine Survey Report (Tetra Tech 2020). Approximately 2,310 acres of occupied whitebark pine habitat were identified within the analysis area for vegetation resources (i.e., Tetra Tech 2020 survey data within the 300-foot buffer on either side of all action alternative components).

3.10.3.2.2 SENSITIVE AND FOREST WATCH SPECIES

3.10.3.2.2.1 Species Known to Occur in the Analysis Area

Two plant species designated as sensitive by the Forest Service are known to occur within or immediately adjacent to the analysis area. These species are least moonwort (*Botrychium simplex*) and Sacajawea’s bitterroot (*Lewisia sacajaweana*). Four forest watch species are known to occur within or immediately adjacent to the analysis area. These are bent-flowered milkvetch (*Astragalus vexilliflexus* var. *vexilliflexus*), Blandow's helodium (*Helodium blandowii*), sweetgrass (*Hierochloe odorata*), and Rannoch-rush (*Scheuchzeria palustris*).

The state and global conservation status rank for each of these plants and Forest Service status as either a sensitive or forest watch species is presented in **Table 3.10-5**. State and global conservation status ranks are categorizations of the relative imperilment and rarity of a species at the state or global level (NatureServe 2012). Conservation status ranks not have any regulatory authority but are useful in understanding the overall degree of vulnerability of a species to impacts such as could occur with the SGP.

More information for each of these species is presented in the text following the table.

Table 3.10-5 State and Global Rank and Forest Service Status for Special Status Plants Known to Occur in the Analysis Area

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]
Astragalus vexilliflexus var. *vexilliflexus*	Bent-flowered milkvetch	S1	G4T4	--	Forest Watch	--
Botrychium simplex	Least moonwort	S2	G5	Sensitive	Sensitive	Forest Watch
Helodium blandowii	Blandow's helodium	S2	G5	--	Forest Watch	Forest Watch
Hierochloe odorata	Sweetgrass	S1	G5	--	--	Forest Watch
Lewisia sacajaweana	Sacajawea's bitterroot	S2	G2	Sensitive	Sensitive	Sensitive
Scheuchzeria palustris	Rannoch-rush	S2	G5	--	--	Forest Watch

Table Source: AECOM 2020a; Forest Service statuses and state ranks are from rare plant lists for the PNF (Forest Service no date) and BNF (Forest Service 2015). Global ranks are from NatureServe Explorer database (NatureServe 2020b)

Table Notes:

1 State ranks are from rare plant lists for the PNF (Forest Service no date) and BNF (Forest Service 2015). State ranks for species not on rare plant lists for the PNF or BNF and global ranks for all species are from NatureServe Explorer database (NatureServe 2020b).

S = State rank indicator; denotes rank based on status within Idaho.

G = Ranks designated at the global (or range-wide) level.

T = Infraspecific taxa (subspecies, plant varieties, and other designations below the level of the species) rank indicator, appended to the global rank for the including species.

1 = Critically imperiled — Typically having 5 or fewer occurrences, or 1,000 or fewer individuals.

2 = Imperiled — Typically having 6 to 20 occurrences, or 1,001 to 3,000 individuals.

3 = Vulnerable — Rare; typically having 21 to 100 occurrences, or 3,001 to 10,000 individuals.

4 = Apparently secure — Uncommon but not rare, but with some cause for long-term concern; typically having 101 or more occurrences, or 10,001 or more individuals.

5 = Secure — Common, widespread, abundant, and lacking major threats or long-term concerns.

2 This column references a species' status as sensitive on the Forest Service Region 4 (Intermountain Region) Proposed, Endangered, Threatened, and Sensitive Species List (Forest Service 2016b), regardless of whether this species is indicated on this list as being present in either the PNF or BNF.

3 This column states if species is designated as sensitive or as a forest watch species according to the PNF rare plant list (Forest Service no date). *Botrychium simplex* is considered a sensitive plant species in the PNF even though the PNF rare plant list indicates it is a forest watch species (Forest Service 2020a).

4 This column states if a species is designated as sensitive or as a forest watch species according to the BNF rare plant list (Forest Service 2015). *Botrychium simplex* is considered a forest watch species in the BNF even though it is a sensitive species at the Region 4 level (Forest Service 2020b).

R4 = Species is designated as sensitive for the Forest Service Region 4 (Intermountain Region).

Bent-flowered Milkvetch

Bent-flowered milkvetch occurs over a range that extends from southern British Columbia and Alberta to southwestern Montana, western Wyoming, and Idaho, eastward to Saskatchewan and South Dakota (Mancuso 2016) (Consortium for Pacific Northwest Herbaria [CPNWH] 2019). Idaho populations occur on exposed, subalpine ridgelines in subalpine fir and whitebark pine parklands on subalpine ridges and upper slopes and all aspects (Mancuso 2016) from 7,500 to 8,500 feet (Forest Service no date). Vegetation in areas of known locations is very open with low ground cover (Mancuso 2016; Moseley 1994). The three occurrences of this species in Idaho all occur in the PNF planning area (Mancuso 2016).

Five subpopulations of a single occurrence (the Cinnabar Peak occurrence) of this species were documented near the SGP during surveys in 2012, 2013 (HDR 2017), and 2016 (Mancuso 2016) (Idaho Fish and Wildlife Information System [IFWIS] 2017). The nearest subpopulation of the Cinnabar Peak occurrence extends from about 300 feet to one-quarter mile upslope from and to the east of the proposed West End Development Rock Storage Facility and West End Creek diversion (Mancuso 2016). This subpopulation, which consists of an estimated total of 7,000 to 10,000 plants, is about 25 acres in size and is located in a relatively undisturbed area (Mancuso 2016). This subpopulation is the largest contiguous area of occupied habitat for this species in Idaho and is considered to be critical to the long-term viability of this species, as it could serve as seed sources for future conservation efforts (Mancuso 2016). The other subpopulations of this occurrence and the other occurrences of this species are located outside the analysis area for the SGP. These subpopulations and occurrences are all smaller in extent and population size than the Cinnabar Peak subpopulation of the Cinnabar Peak occurrence (Mancuso 2016).

Least Moonwort

Least moonwort occurs throughout the Rocky Mountain Range in British Columbia, Alberta, Washington, Oregon, Idaho, Montana and Wyoming; Cascade Range in Washington, Oregon, and California; and Sierra Nevada Range in California (CPNWH 2019). Lease moonwort is found in a variety of habitats including meadows, forests, and roadside areas (Colorado Natural Heritage Project 2006; Forest Service 2015, no date), dry fields, marshes, bogs, swamps, and roadside ditches, usually in areas with subacid soils (NatureServe 2020c).

Two subpopulations of a single occurrence of least moonwort occur in swales adjacent to Johnson Creek Road (IFWIS 2017), which would be improved under Alternative 4. These subpopulations were last observed in 2004 and had estimated population sizes of approximately 360 plants in each subpopulation (IFWIS 2017). This species was not included in past SGP-related surveys performed by contractors for the Midas Gold Idaho, Inc (Midas Gold) in 2012, 2013, or 2014 (HDR 2017).

Blandow's Helodium

Blandow's helodium occurs in the Rocky Mountain, Cascade, Alaska, and Brooks ranges in Alaska, and in the provinces of Yukon, British Columbia, and Alberta in Canada and in

Washington, Oregon, Montana, Idaho, and Wyoming (CPNWH 2019). Habitat for this species is mats and hummocks in montane peatlands, fens, and bogs, and under sedges and shrubs or along streams in mires (Forest Service 2015). It occurs in wetlands and along streams between 3,900 to 6,600 feet elevation in and at edges of conifer forests on the eastside of PNF (Forest Service no date). It forms mats and small hummocks in medium to rich montane fens with calcareous groundwater and sometimes occurs under sedges and shrubs around the edges of fens or along streamlets in fens (Forest Service 2007b).

A single occurrence of Blandow's helodium occurs in the analysis area near Trapper Creek approximately 100 feet from where the proposed Burntlog Route would cross the Trapper Flat wetland (IFWIS 2017). This occurrence was last observed in 2004 and consists of an unknown number of individuals (IFWIS 2017) and was not included in past SGP-related surveys performed by contractors for the Midas Gold in 2012, 2013, or 2014 (HDR 2017).

Sweetgrass

The range for sweetgrass is the Rocky Mountain, Cascade, Alaska, and Brooks ranges in Alaska (including Seward Peninsula), the provinces of Yukon, British Columbia, and Alberta in Canada, and the states of Washington, Oregon, Montana, Idaho, Wyoming, and Utah (CPNWH 2019). Its habitat is described as moist slopes, meadows and streambanks from the foothills to subalpine elevations (Forest Service 2015), moist soil of lower montane to subalpine meadows and slopes (Hitchcock and Cronquist 1973), and edges of sloughs and marshes, bogs, shaded streambanks, lakeshores, and cool mountain canyons (Walsh 1994).

A single occurrence of sweetgrass is found in the analysis area in the wetlands near Trapper Creek, approximately 780 feet to over 1,000 feet from where the proposed Burntlog Route would cross the Trapper Flat wetland area (IFWIS 2017). The location of this species is hydrologically connected to the proposed location of the proposed new road through the wetlands around Trapper Creek under Alternatives 1, 2, and 3 and is thus considered to be within the analysis area. This occurrence was last observed in 2004 and consists of an unknown number of individuals (IFWIS 2017). This species was not included in past SGP-related surveys performed by contractors for Midas Gold in 2012, 2013, or 2014 (HDR 2017).

Sacajawea's Bitterroot

The range for Sacajawea's bitterroot is the Rocky Mountains in Idaho (CPNWH 2019), with roughly three-fourths of the populations occurring on the BNF (Forest Service 2014).

Sacajawea's bitterroot inhabits relatively sparsely vegetated upper slopes and ridgetops in montane and subalpine habitats (Forest Service 2015; NatureServe 2020d) in areas with fractured bedrock and granitic soils near late snowbanks at elevations of between 5,400 to 9,500 feet (Forest Service 2015). Vegetation communities around existing populations are mostly bare subalpine woodlands and open ridges, but it also is known to occur in Ponderosa pine habitat from 4,500 to 6,500 feet (Forest Service no date).

A single occurrence of Sacajawea's bitterroot occurs in the analysis area approximately 300 feet above Warm Lake Road and the existing transmission line corridor near the intersection of Warm Lake Road with Curtis Creek Road (IFWIS 2017). This occurrence was last observed in 1999 and has an unknown number of individuals (IFWIS 2017). This occurrence was not documented by surveyors in 2014 although this species was targeted during surveys that year (HDR 2017).

Rannoch-rush

The range for Rannoch-rush is from the Rocky Mountain, Alaska, and Cascade ranges in Alaska, the Canadian provinces of Yukon and British Columbia, and the states of Washington, Oregon, Idaho, and Montana (CPNWH 2019). Its habitat is full sun areas in sphagnum bogs and peatlands (NatureServe 2020e) (Forest Service 2015).

A single occurrence of this species has been documented in the analysis area by Idaho Fish and Game in the Mud Lake area (Idaho Department of Fish and Game 2004; IFWIS 2017) approximately 200 feet from an existing portion of Burnt Log Road (FR 447), which would be widened for use under Alternatives 1, 2, and 3. This occurrence was last observed in 2001 and has an unknown number of individuals (IFWIS 2017). This species was not included in past SGP-related surveys performed by contractors for Midas Gold in 2012, 2013, or 2014 (HDR 2017).

3.10.3.2.2.2 Species with Potential to Occur in the Analysis Area

Modeled potential habitat for Forest Service-designated sensitive or forest watch species occurs on 9,888 acres in the analysis area, all within the boundaries of the PNF and BNF. Areas of modeled potential habitat occur on approximately 53 percent of the analysis area or 64 percent of lands administered by the PNF and BNF.

Table 3.10-6 presents a list of the 29 sensitive or forest watch species that have the potential to occur in the analysis area and for which habitat modeling was performed. Modeling methods, results, and rationale for determining that these species have potential to occur in the analysis area are presented in Stibnite Gold Project EIS Technical Report: Special Status Plant Potential Habitat Modeling Report (AECOM 2020b). This table also presents information on whether past surveys have been completed for these species, any populations within or near the analysis area, and the extent and general area of modeled potential habitat for these species within the analysis area.

Ranges, habitat information and acres of modeled potential habitat are found in **Appendix H-3** (**Tables H-3-1** and **H-3-2**). Figures showing the modeled potential habitat for these species are found in **Appendix H-4**.

Table 3.10-6 Location and Past Survey Information for Special Status Plants for which Potential Habitat Modeling was Performed within the Analysis Area

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Allotropa virgata	Candystick	S3	G4	Sensitive	Sensitive	--	• No known occurrences in the analysis area. • This species has not been included in past special status plant surveys for the SGP.	498.6 acres of potential habitat are modeled near the proposed mine site, the transmission line route, Burntlog Route, Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), and Johnson Creek Road (CR 10-413).
Astragalus vexilliflexus var. *vexilliflexus*	Bent-flowered milkvetch	S1	G4T4	--	Forest Watch	--	• Four subpopulations of a single occurrence of this species are located near the SGP (Mancuso 2016), one of which extends from approximately one-quarter mile to around 300 feet upslope from and to the east of the proposed West End Development Rock Storage Facility and West End Creek diversion. • This species was targeted during surveys in 2012, 2013 (HDR 2017), and 2016 (Mancuso 2016).	87.3 acres of potential habitat are modeled near the proposed mine site, the transmission line route, and Meadow Creek Lookout Road (FR 51290).
Botrychium crenulatum	Scalloped moonwort	S1	G4	Sensitive	--	Forest Watch	• No known populations in the analysis area. • This species has not been included in past special status plant surveys for the SGP.	87.3 acres of potential habitat are modeled along Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road portion of the McCall-Stibnite Road (CR 50-412), the transmission line corridor, and the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Botrychium lineare	Slender moonwort	SH	G2	Sensitive	Forest Watch	--	• No known occurrences in the analysis area. • This species has not been included in past special status plant surveys for the SGP.	1,209.6 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Botrychium simplex	Least moonwort	S2	G5	Sensitive	Sensitive	Forest Watch	• Two subpopulations of a single occurrence of this species occur in swales adjacent to Johnson Creek Road (IFWIS 2017). • This species has not been included in past special status plant surveys for the SGP.	1,209.6 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Bryum calobryoides	Beautiful Bryum	SH[8]	G3	Sensitive	--	Sensitive	• No known occurrences in the analysis area. • This species has not been included in past special status plant surveys for the SGP.	108.5 acres of potential habitat are modeled along Stibnite Road (CR 50-412), Johnson Creek Road (CR 10-413), Burntlog Route, and Warm Lake Road (CR 10-579).
Buxbaumia viridis	Green bug moss	S3	G4/G5	--	Forest Watch	--	• No known occurrences in the analysis area. • This species has not been included in past special status plant surveys for the SGP.	443.2 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), and at the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Calamagrostis tweedyi	Cascade reedgrass	S2	G3	Sensitive	Sensitive	--	• No known occurrences in the analysis area. • This species has not been included in past special status plant surveys for the SGP.	5,015.0 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Carex livida	Livid sedge	S2	G5	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	957.4 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, McCall-Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Carex straminiformis	Shasta sedge	S3	G5	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	930.6 acres of potential habitat are modeled along Burntlog Route, Old Thunder Mountain Road (FR 440), Meadow Creek Lookout Road (FR 51290), the transmission line route, and the proposed mine site.
Cicuta bulbifera	Bulblet-bearing water hemlock	S2	G5	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	188.3 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Douglasia idahoensis	Idaho douglasia	S3	G3	Sensitive	Sensitive	Sensitive	• One occurrence of this species occurs approximately 0.25 mile north of Warm Lake Road in an area west of Warm Lake (IFWIS 2017), which is outside the analysis area. • This species was not documented by surveyors in 2014 although it was targeted during surveys that year (HDR 2017).	137.6 acres of potential habitat are modeled along Burntlog Route, Meadow Creek Lookout Road (FR 51290), the transmission line route, and the proposed mine site.
Draba incerta	Yellowstone draba	S2	G5	--	Forest Watch	--	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	433.6 acres of potential habitat are modeled along Burntlog Route, Meadow Creek Lookout Road (FR 51290), Old Thunder Mountain Road (FR 440), the transmission line route, and at the proposed mine site.
Drosera intermedia	Spoonleaf sundew	S1	G5	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	957.4 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), Meadow Creek Lookout Road (FR 51290), Old Thunder Mountain Road (FR 440), the transmission line route, and the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Epilobium palustre	Swamp willow weed	S3	G5	--	Forest Watch	--	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	100.4 acres of potential habitat are modeled along Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and at the proposed mine site.
Epipactis gigantea	Giant helleborine orchid	S2S3	G3G4	--	Forest Watch	--	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	140.8 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), and Stibnite Road (CR 50-412).
Helodium blandowii	Blandow's helodium	S2	G5	--	Forest Watch	Forest Watch	• One occurrence of this species is located near Trapper Creek within 300 feet of the proposed Burntlog Route (IFWIS 2017). • This species has not been included in past special status plant surveys for the SGP.	738.0 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and at the proposed mine site.
Hierochloe odorata	Sweetgrass	S2	G5	--	--	Forest Watch	• One occurrence of this species is found in the wetlands near Trapper Creek, approximately 700 feet from the proposed Burntlog Route (IFWIS 2017). • This species has not been included in past special status plant surveys for the SGP	952.4 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 0-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and at the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Lewisia sacajaweana	Sacajawea's bitterroot	S2	G2	Sensitive	Sensitive	Sensitive	• One occurrence of this species is located approximately 300 feet above Warm Lake Road and the existing transmission line corridor near the intersection of Warm Lake Road with Curtis Creek Road (IFWIS 2017). • This occurrence was not documented by surveyors in 2014 although this species was targeted during surveys that year (HDR 2017).	3,260.5 acres of potential habitat are modeled along Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, the transmission line route, and the proposed mine site.
Mimulus clivicola	Bank monkeyflower	S3	G4	Sensitive	Sensitive	--	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	427.3 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, the transmission line route, and the proposed mine site.
Penstemon laxus	Tufted penstemon	S2	G2	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	408.3 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), and at the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Polystichum kruckebergii	Kruckeberg's Sword-fern	S2	G4	--	Forest Watch	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	1,210.7 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, the transmission line route, and the proposed mine site.
Rhynchospora alba	White beaksedge	S2	G5	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	432.1 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Sanicula graveolens	Sierra sanicle	S2	G4G5	--	Forest Watch	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	1,182.2 acres of potential habitat are modeled along Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, the transmission line route, and the proposed mine site.
Saxifraga tolmiei var. *ledifolia*	Tolmie's saxifrage	SNR	G5	Sensitive	--	--	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	875.6 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Johnson Creek Road (CR 10-413), Burntlog Route, the transmission line route, and the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Scheuchzeria palustris	Rannoch-rush	S2	G5	--	--	Forest Watch	• A occurrence of this species has been documented by Idaho Fish and Game in the Mud Lake area (Idaho Department of Fish and Game 2004; IFWIS 2017) within 300 feet of an existing portion of Burnt Log Road (FR 447). • This species has not been included in past special status plant surveys for the SGP.	957.4 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Sedum borschii	Borsch's stonecrop	S2	G4	--	Forest Watch	--	• A single historical occurrence of this species is located in the analysis area. This occurrence was not found the last time it was surveyed for (1983). • This species has not been included in past special status plant surveys for the SGP.	99.4 acres of potential habitat are modeled along Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.
Sedum leibergii	Leiberg stonecrop	S2	GNR	--	--	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	99.4 acres of potential habitat are modeled along Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.

Scientific Name	Common Name	State Rank[1]	Global Rank[1]	Forest Service R4 Status[2]	PNF Status[3]	BNF Status[4]	Populations[5] and Past Surveys in analysis area[6]	Extent of Modeled Potential Habitat in the Analysis Area[7]
Triantha occidentalis ssp. *brevistyla*	Short-style tofieldia	S1	G5T4	Sensitive	Sensitive	Forest Watch	• No known occurrences in or near the analysis area. • This species has not been included in past special status plant surveys for the SGP.	755.0 acres of potential habitat are modeled along Warm Lake Road (CR 10-579), Cabin Creek Road (FR 50467), Johnson Creek Road (CR 10-413), Burntlog Route, Stibnite Road (CR 50-412), the transmission line route, and the proposed mine site.

Table Source: AECOM 2020a; Refer to AECOM 2020b for rationale used in determining presence or absence of potential habitat for species in the analysis area. Specific data sources are listed in the footnotes below.

Table Notes:

1 State ranks are from rare plant lists for the PNF (Forest Service no date) and BNF (Forest Service 2015). State ranks for species not on rare plant lists for the PNF or BNF and global ranks for all species are from NatureServe Explorer database (NatureServe 2020b).

S = State rank indicator; denotes rank based on status within Idaho.

G = Ranks designated at the global (or range-wide) level.

T = Infraspecific taxa (subspecies, plant varieties, and other designations below the level of the species) rank indicator, appended to the global rank for the including species.

1 = Critically imperiled — Typically having 5 or fewer occurrences, or 1,000 or fewer individuals.

2 = Imperiled — Typically having 6 to 20 occurrences, or 1,001 to 3,000 individuals.

3 = Vulnerable — Rare; typically having 21 to 100 occurrences, or 3,001 to 10,000 individuals.

4 = Apparently secure — Uncommon but not rare, but with some cause for long-term concern; typically having 101 or more occurrences, or 10,001 or more individuals.

5 = Secure — Common, widespread, abundant, and lacking major threats or long-term concerns.

H = Historical occurrence (i.e., formerly part of the native biota; implied expectation that it might be rediscovered or possibly extinct).

NR = Not ranked.

2 This column references a species' status as sensitive on the Forest Service Region 4 (Intermountain Region) Proposed, Endangered, Threatened, and Sensitive Species List (Forest Service 2016b), regardless of whether this species is indicated on this list as being present in either the PNF or BNF.

3 This column states if species is designated as sensitive or as a forest watch species according to the PNF rare plant list (Forest Service no date). Least moonwort (*Botrychium simplex*) is considered a sensitive plant species in the PNF even though the PNF rare plant list indicates it is a forest watch species (Forest Service 2020a).

4 This column states if a species is designated as sensitive or as a forest watch species according to the BNF rare plant list (Forest Service 2015). Scalloped moonwort (*Botrychium crenulatum*), least moonwort (*B. simplex*), and short-style tofieldia (*Triantha occidentalis* ssp. *brevistyla*) are considered forest watch species in the BNF even though they are designated as sensitive at the Region 4 level (Forest Service 2020b).

5 Occurrence data for species were derived from IFWIS spatial data (IFWIS 2017).

6 Refers to past SGP-related surveys performed by contractors for the Proponent in 2012, 2013, and 2014 (HDR 2017).

7 Figures showing the modeled potential habitat for these species can be found in the potential habitat modeling report (AECOM 2020b).

8 Beautiful bryum (*Bryum calobryoides*) is ranked as a state historical species but was included in this analysis as is a sensitive species in the Boise National Forest and its habitat conditions match those found in portions of the analysis area.

R4 = Species is designated as sensitive for the Forest Service Region 4 (Intermountain Region).

BNF = Boise National Forest.

PNF = Payette National Forest.

3.10.3.3 Non-Native Plants

Non-native plants are those that have been introduced by humans into an area where they are not native and that are able to establish on many sites, grow quickly, and spread to the point of disrupting plant communities or ecosystems, or whose introduction causes or is likely to cause economic or environmental harm or harm to human health (EO 13112). Noxious weeds are non-native plants designated by the Director of the ISDA as having the potential to cause injury to public health, crops, livestock, land, or other property (Idaho Statute 22-2402). The ISDA is responsible for administering the State Noxious Weed Law in Idaho and maintains a list of noxious species. Noxious weeds are managed by the Forest Service on NFS lands with cooperation from ISDA and Tribal and County governments. Noxious weed categories are as follows:

- Early Detection and Rapid Response – Plants in this category must be reported to the ISDA within 10 days of being identified by an approved, qualified authority. Eradication must begin in the same season the species is found. No known species of Early Detection and Rapid Response are known in the subregion.
- Containment – The goal for these species is to reduce or eliminate new or small infestations and to manage established populations as determined by the weed control authority.
- Control – The goal for these species is to reduce or eliminate new or expanding weed populations. In some areas of the state, control or eradication is possible, and a plan must be written that will reduce infestations within 5 years.

Table 3.10-7 lists the noxious weeds and non-native plant species documented in the analysis area and surrounding area in Valley County, Idaho. Species in this table that have or have not been documented in the analysis area have the potential to spread from surrounding areas throughout the analysis area. Noxious weeds and non-native plants are commonly found along roads and in other areas disturbed by soil movement or vegetation clearing. Locations of non-native plant invasions as recorded by the Forest Service and Midas Gold contractors (HDR 2017) in the analysis area are shown in **Appendix H-2**. Spotted knapweed (*Centaurea stoebe* ssp. *micranthos*) and rush skeletonweed (*Chondrilla juncea*), both Containment species, are the most extensive in the analysis area and generally occur along roads (Forest Service 2019c).

Table 3.10-7 Noxious Weeds and Non-Native Plant Species in Valley County and the Analysis Area

Scientific Name	Common Name	Category	Where Known
Cardaria draba	Whitetop	Noxious- Containment	Valley County
Centaurea diffusa	Diffuse knapweed	Noxious- Containment	Valley County
Centaurea stoebe ssp. *micranthos*	Spotted knapweed	Noxious- Containment	Valley County; analysis area
Chondrilla juncea	Rush skeletonweed	Noxious- Containment	Valley County; analysis area
Chrysanthemum leucanthemum	Oxeye daisy	Noxious- Containment	Valley County; analysis area
Cirsium arvense	Canada thistle	Noxious- Containment	Valley County; analysis area
Cirsium vulgare	Bull thistle	Non-native species	Valley County; analysis area
Conium maculatum	Poison hemlock	Noxious- Containment	Valley County
Convolvulus arvensis	Field bindweed	Noxious- Containment	Valley County
Cynoglossum officinale	Houndstongue	Noxious- Containment	Valley County
Euphorbia esula	Leafy spurge	Noxious- Containment	Valley County
Hieracium aurantiacum	Orange hawkweed	Noxious- Control	Valley County
Hyoscyamus niger	Black henbane	Noxious- Control	Analysis area (not officially documented in Valley County)
Linaria dalmatica	Dalmatian toadflax	Noxious- Containment	Valley County; analysis area
Linaria vulgaris	Yellow toadflax	Noxious- Containment	Valley County; analysis area
Myriophyllum spicatum	Eurasian watermilfoil	Noxious- Control	Valley County
Onorpodium acanthium	Scotch thistle	Noxious- Containment	Valley County
Senecio jacobaea	Tansy ragwort	Noxious- Containment	Valley County

Table Source: AECOM 2020a; Forest Service 2019c; HDR 2017; ISDA 2017; U.S. Department of Agriculture 2019; Valley County 2019

3.11 WETLANDS AND RIPARIAN RESOURCES

3.11.1 Introduction and Scope of Analysis

Wetlands and riparian resources form a connection of terrestrial and aquatic ecosystems. As ecotones (i.e., a transition area between two adjacent ecological communities) they have features of both terrestrial and aquatic environments. They are some of the most productive habitats on earth and support a broad array of functions and services, including, but not limited to: flood attenuation; biological diversity; recreation and cultural services; and climate regulation (Keddy 2010). Wetland and riparian habitat are essential to many fish, amphibians, birds, invertebrates, and other wildlife. Approximately 10 percent of Idaho's birds are completely dependent upon these habitats and are rarely found elsewhere (Murphy 2012). Wetlands are defined in the Clean Water Act (CWA) regulations (33 Code of Federal Regulations § 328.3) as, "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Together with streams, lakes, and other waters, many wetlands receive federal protection under the CWA due to their ecological importance and because of a historical trend of wetland loss as many of the nation's wetlands have been altered for agriculture and development (U.S. Environmental Protection Agency [EPA] 2019). Wetlands are valued for their contribution to water quality (sediment filtration, nutrient/toxicant uptake), water storage, flood hazard abatement, and habitat for wetland-dependent plant and animal species. Ecologically, they are environmentally sensitive lands and important habitat for birds, amphibians, fish, and other wildlife (U.S. Forest Service [Forest Service] 2003).

The Boise National Forest Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2010) defines riparian areas as, "Terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated with high water tables, and soils that exhibit some wetness characteristics." Riparian areas are located along streams and rivers providing a transition zone between aquatic conditions and upland conditions. Both the Boise Forest Plan and the Payette National Forest Land and Resource Management Plan (Payette Forest Plan) recognize the importance of riparian areas and provide a means of identifying and conserving them in an Aquatic Conservation Strategy (Forest Service 2003). Important functions identified in the Forest Plans for riparian areas include the delivery of materials that provide: structure in streams, shading, water quality protection, and channel stability. In addition, riparian areas are recognized as important habitat for wildlife that utilize aquatic areas for food and water.

The following sections describe the geographic extent and general conditions of wetlands and riparian areas within the vicinity of the proposed Stibnite Gold Project (SGP). Wetland and riparian systems are influenced by underlying soils and hydrology conditions, and detailed discussions of the existing conditions associated with these elements are provided in Surface Water and Groundwater Quality (Section 3.9) and Soils and Reclamation Cover Materials (Section 3.5).

3.11.1.1 Scope of Analysis

The analysis area for wetlands includes a mine site focus area and an off-site focus area, which includes proposed off-site components of the SGP, such as access roads and transmission line infrastructure. The mine site focus area is where most wetland impacts would occur under the proposed SGP, and where a substantial portion of the affected watershed has been evaluated for wetland presence. The off-site focus area is primarily linear, narrow corridors where wetlands were evaluated. Wetlands were not generally evaluated within the larger surrounding watersheds for these off-site corridors.

The analysis area is shown in **Figure 3.11-1**. The extent of the analysis area at the mine site focus area is the wetland study area boundary, which includes wetland functional assessment areas (AAs) 1 through 29, 38, 39, and 41 as well as other wetlands identified in the National Wetland Inventory (NWI) data and aerial photograph interpretation (**Figure 3.11-2**). The mine site focus area includes most of the contributing basins for the drainages contained within the proposed mine site. The mine site focus area allows for quantification of wetlands that would be affected by the proposed SGP at the mine site, presented in Section 4.11, Environmental Consequences, Wetlands and Riparian Resources. Due to the degree of proposed landscape modification and wetland impacts that could occur at the mine site, evaluating wetland impacts within the context of the existing disturbed landscape condition is an important aspect of analysis presented in Section 4.11.

All other wetland AAs (30 through 37, 40, and 42 through 44) and other wetlands identified via NWI data and aerial photograph interpretation are included in the off-site focus area that extends outside the proposed mine site (**Figure 3.11-1**). For proposed SGP components located outside the mine site, the focus area for wetlands and riparian resources extends to the 5th field (10-digit Hydrologic Unit Codes [HUC]) watersheds that overlap potential SGP disturbance areas (**Figure 3.11-1**). Hydrologic units are defined by the U.S. Geological Survey. The off-site focus area extent was selected to account for the watersheds that could be affected by off-site activities proposed under the SGP. These watersheds provide geographic context for potential hydrologically connected off-site wetland and riparian resources.

Wetlands within the analysis area were delineated between 2012 and 2016, and were documented in several wetland reports that were then summarized in one document in 2017 (**Table 3.11-1**). In addition, wetland functional assessments were performed for delineated wetlands in various locations in the vicinity of the proposed SGP and documented in a functional assessment report (HDR, Inc. [HDR] 2016a) and addendum (Tetra Tech 2018) (**Table 3.11-2**).

Table 3.11-1 Wetland Delineation Reports Prepared for the Proposed SGP

Report	Source	Date	Associated Major Drainages	Summary of Area Covered
Wetland Resources Baseline Study, Stibnite Gold Project	HDR	July 2013	Meadow Creek, East Fork Meadow Creek (Blowout Creek), Fiddle Creek, Garnet Creek, Midnight Creek, Hennessy Creek, Rabbit Creek, West End Creek, Sugar Creek, EFSFSR	Proposed mine site and nearby waters beyond the mine site boundary.
Wetland Resources Baseline Study Addendum #1, Stibnite Gold Project	HDR	January 2014	EFSFSR, Cabin Creek, Trout Creek, Johnson Creek	Proposed access roads including Burntlog Route, Cabin/Trout Creek Route, Thunder Mountain Road, Riordan Road, Johnson Creek Road (north of the Riordan and Thunder Mountain Alternatives), and Stibnite Road.
Wetland Resources Baseline Study Addendum #2, Stibnite Gold Project	HDR	December 2014	Meadow Creek, No Mans Creek, Riordan Creek, Johnson Creek, Cabin Creek, Warm Lake Creek, SFSR, Curtis Creek, Big Creek	1) The transmission line corridor between the proposed mine site and the western boundary of the Boise National Forest; 2) a revised segment of the proposed Burntlog Route access road; and 3) additional areas of potential impact within the proposed mine site.
Wetland Resources Baseline Study Addendum #3, Stibnite Gold Project	HDR	August 2015	Pearsol Creek, Beaver Creek, Center Canal/Cascade Lake, Gold Fork Canal, Gold Fork River, Willow Creek, Boulder Creek, Lake Fork Creek	Portions of the transmission line corridor located on private lands (using NWI wetland data methods).
Wetland Resources Baseline Study Addendum #4, Stibnite Gold Project	HDR	August 2016	East Fork Burntlog Creek, EFSFSR, Johnson Creek, Meadow Creek (Blowout Creek)	1) Proposed Burntlog Route revisions; 2) Off-highway vehicle access trail; 3) Potential Meadow Creek growth media stockpile areas; 4) Potential West End Creek development rock storage facility; and 5) Potential location of Landmark Maintenance Facility.
Wetland Resources Baseline Study for Logistics Center Site, Stibnite Gold Project	HDR	December 2016	Big Creek (tributary of North Fork of the Payette River)	Potential Stibnite Gold Logistics Facility site.
Summary of Project Wetland Resource Baseline Studies	HDR	April 2017	All	Summary of all wetland baseline reports.

Table Source: HDR 2013, 2014a,b, 2015, 2016b,c, 2017

Table Notes:

EFSFSR = East Fork South Fork Salmon River.

SFSR = South Fork Salmon River.

Table 3.11-2 Wetland Functional Assessment Report and Addendum Prepared for the Proposed SGP

Report	Source	Date	Associated Major Drainages	Summary of Area Covered
The Stibnite Gold Project, Wetland Functional Assessment Report	HDR	March 2016	Meadow Creek (Blowout Creek), EFSFSR, Fiddle Creek, Garnet Creek, Midnight Creek, Hennessy Creek, Rabbit Creek, West End Creek, Sugar Creek	Proposed mine site and primary access road alternative routes.
Additional Information to Amend the 2016 HDR Wetlands Functions and Values Assessment	Tetra Tech	March 2018	All	Updated previous assessments and added new wetland areas that were not delineated previously by HDR at the mine site. Also added wetland assessment units for the SGLF, transmission line route, and the Landmark Maintenance Facility.

Table Source: HDR 2016a; Tetra Tech 2018

Table Notes:

EFSFSR = East Fork South Fork Salmon River.

SGLF = Stibnite Gold Logistics Facility.

Wetlands included in the functional assessment report were grouped into 44 wetland AAs based on watershed, hydrogeomorphic class, and level of disturbance (e.g., evidence of recent burns, etc.) (Tetra Tech 2018). The size, location, and characteristics (i.e., wetland category and functions) of each AA are presented in **Table I-1** in **Appendix I-1**. Greater detail on wetland functional assessment methodology and results is presented in Section 3.11.3.4, Assessed Wetland Functions and Values.

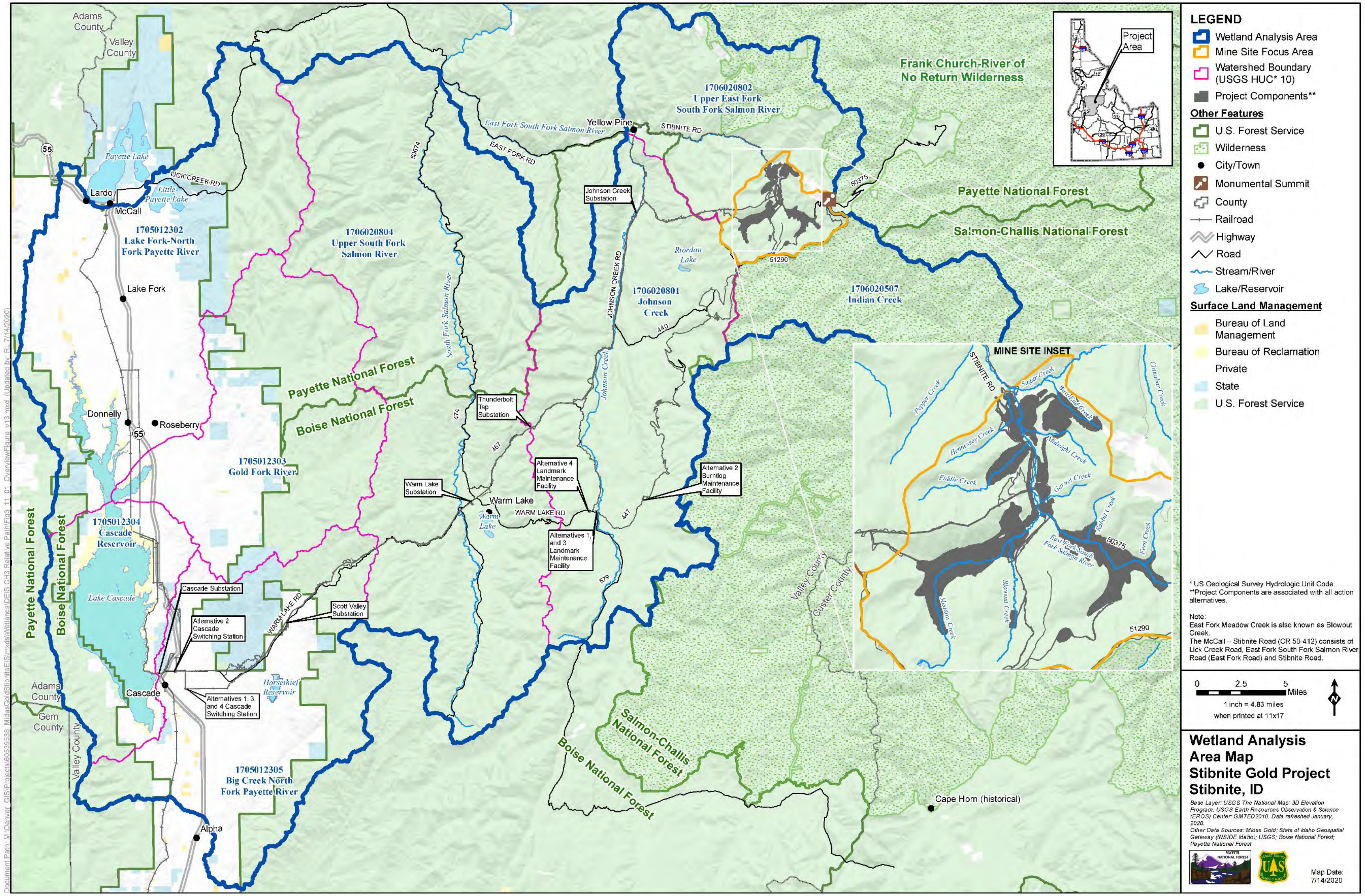

Figure Source: AECOM 2020

Figure 3.11-1 Wetland Analysis Area Map

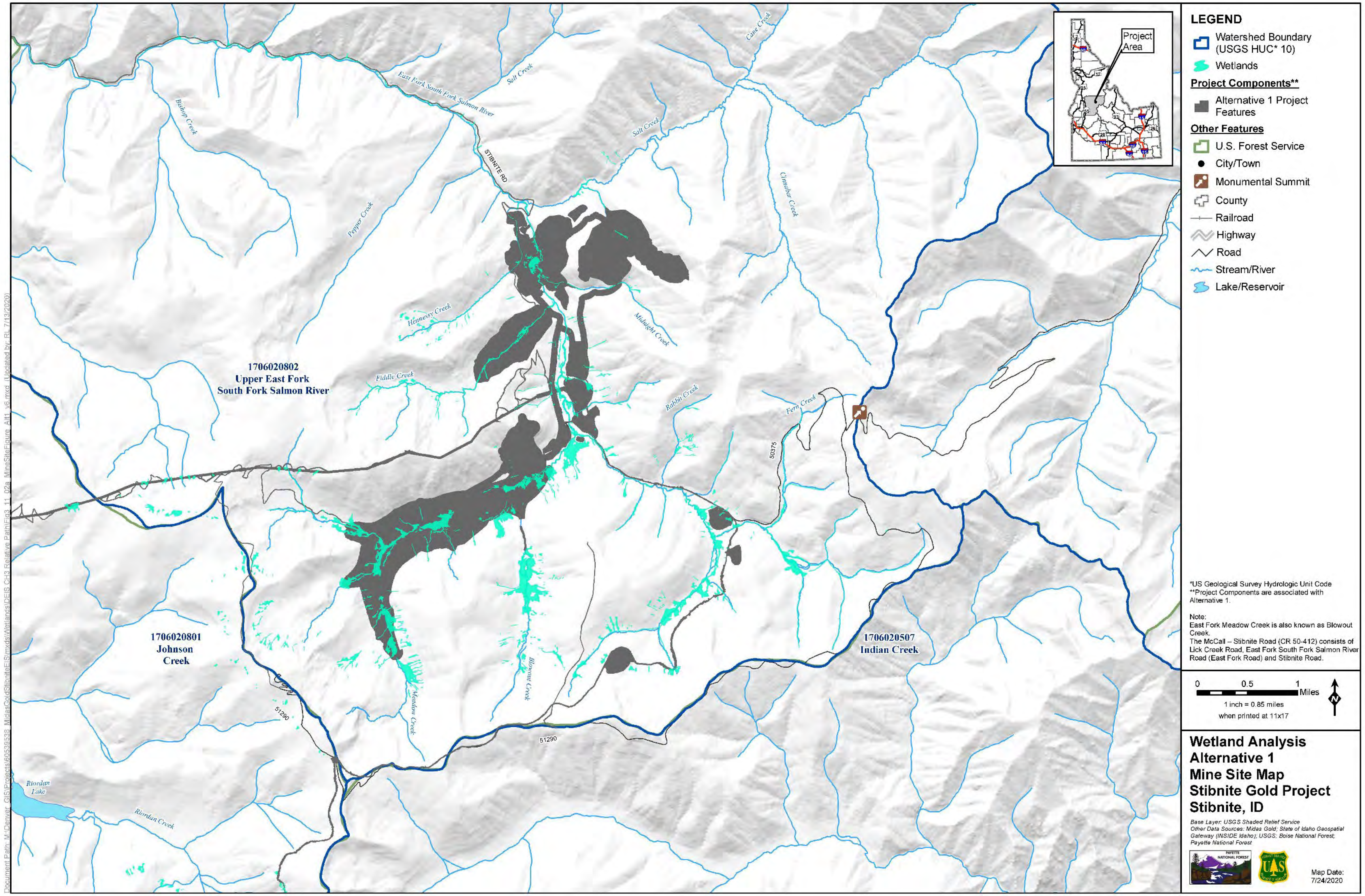

Figure Source: AECOM 2020

Figure 3.11-2a Wetland Analysis Alternative 1 Mine Site Map

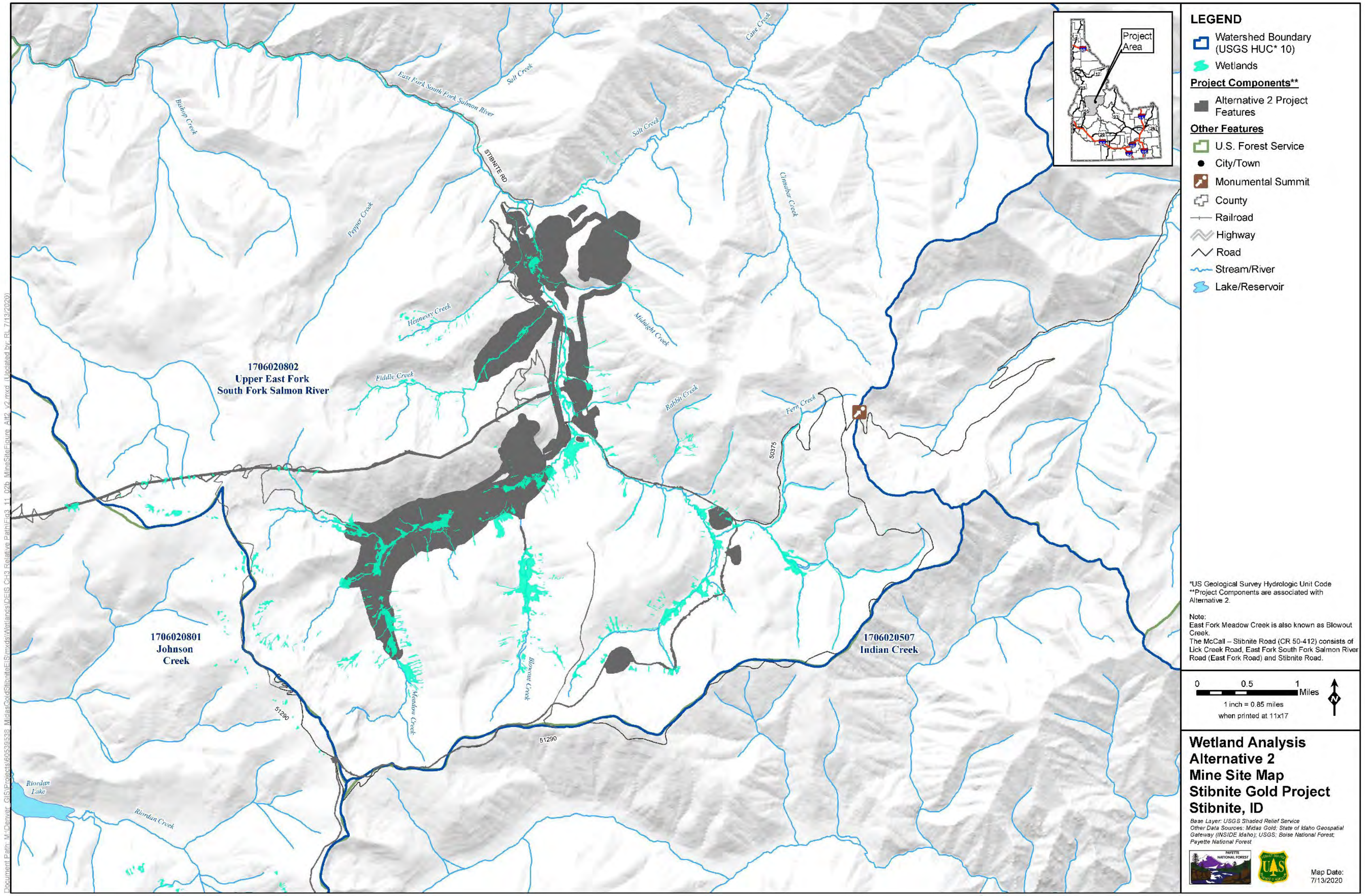

Figure Source: AECOM 2020

Figure 3.11-2b Wetland Analysis Alternative 2 Mine Site Map

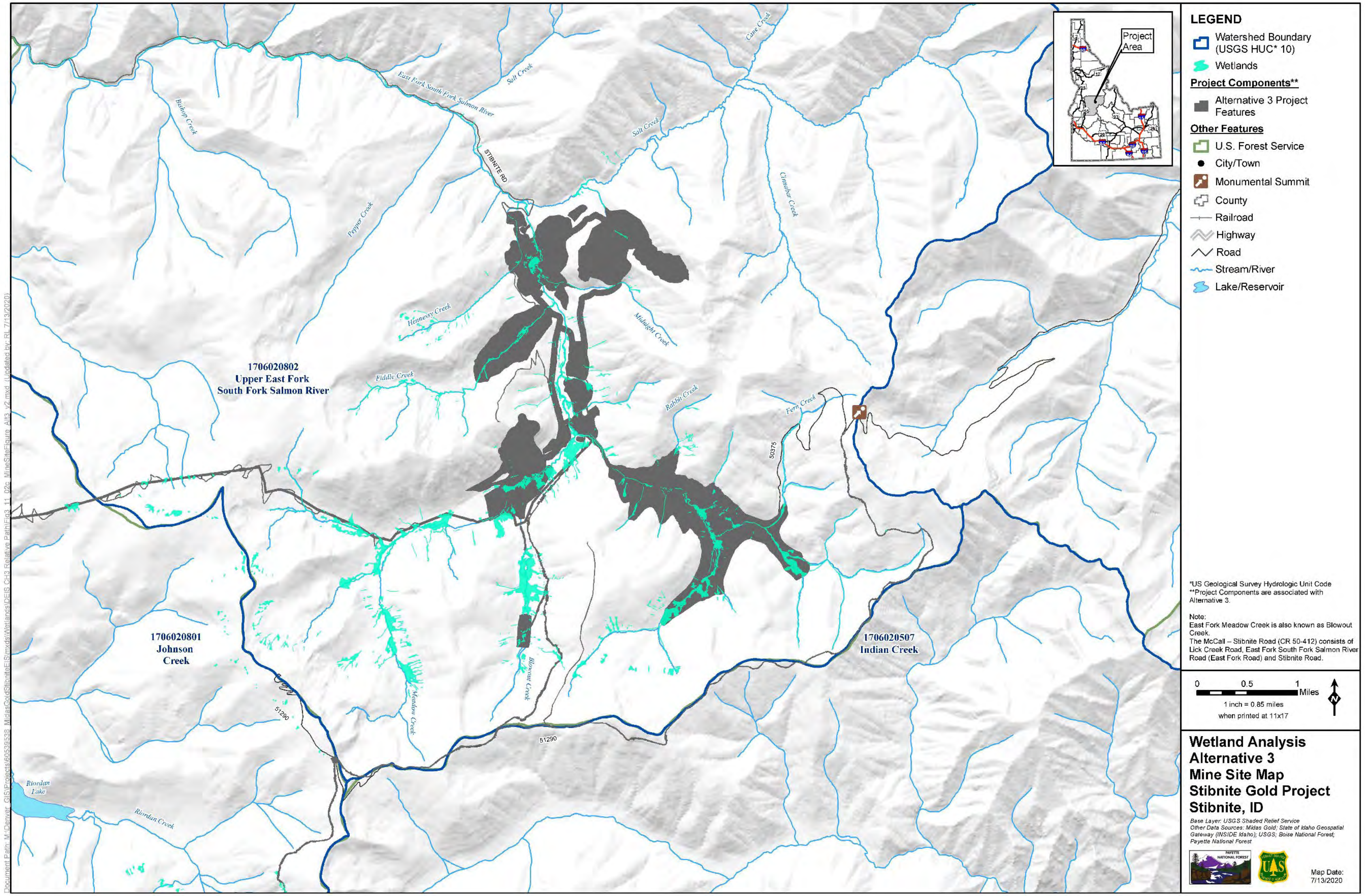

Figure Source: AECOM 2020

Figure 3.11-2c Wetland Analysis Alternative 3 Mine Site Map

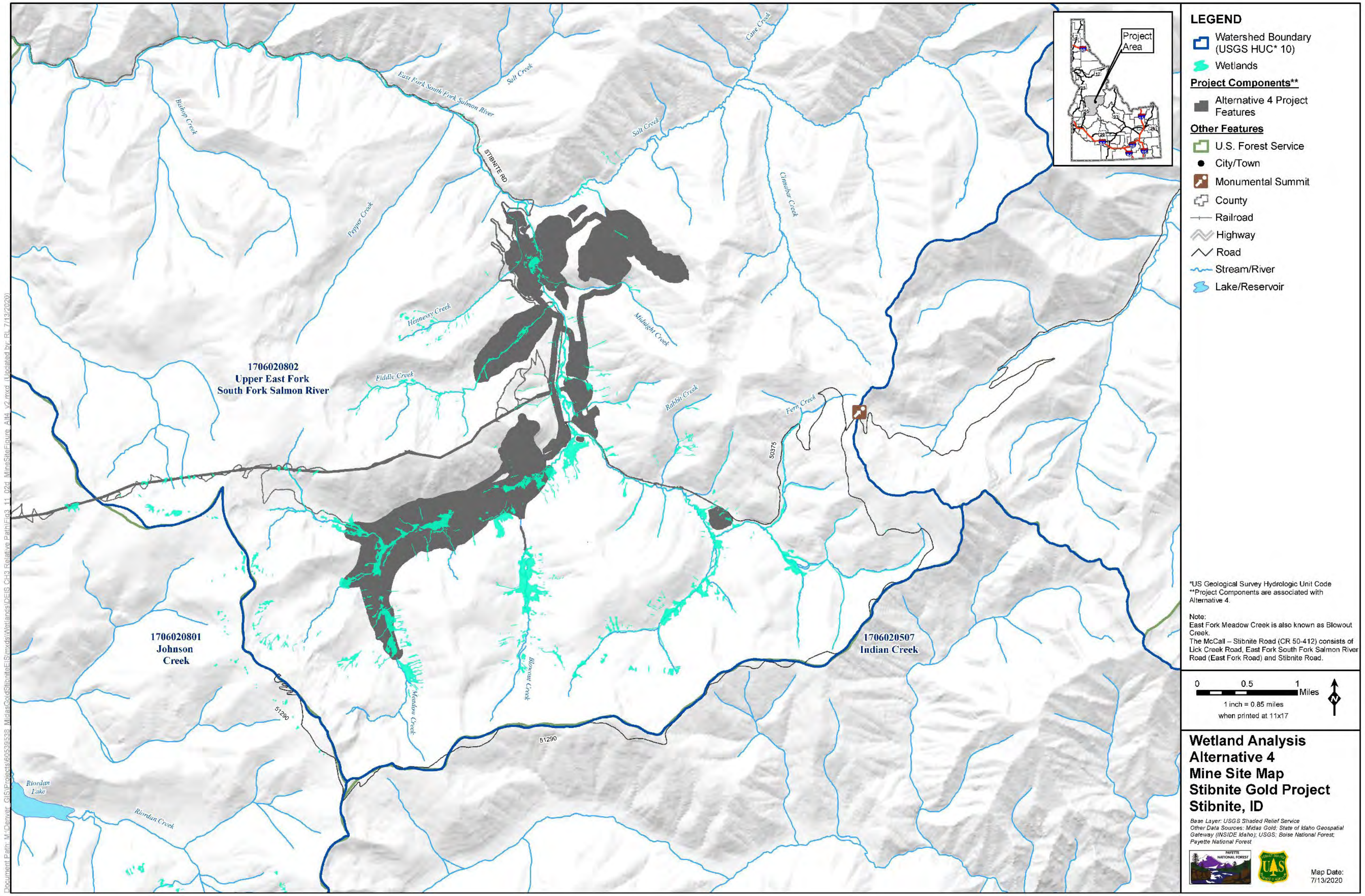

Figure Source: AECOM 2020

Figure 3.11-2d Wetland Analysis Alternative 4 Mine Site Map

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3.11.2 Relevant Laws, Regulations, Policies, and Plans

3.11.2.1 Clean Water Act

Federal regulations governing discharges of dredged or fill material into waters of the U.S. (WOTUS), including wetlands, are promulgated under Section 404 of the CWA, as administered by the U.S. Army Corps of Engineers (USACE). Under Section 404 of the CWA; WOTUS, including wetlands, fall under the jurisdiction of the USACE. Thus, any discharge of dredged or fill material into jurisdictional wetlands or other WOTUS in the proposed SGP area would require a Department of the Army Section 404 Permit.

Additionally, Section 404(b)(1) guidelines (Guidelines) promulgated by the EPA, in conjunction with the USACE, apply to an applicant's proposed disposal site(s) for discharges of dredged or fill material into WOTUS. The Guidelines prohibit, for example, the authorization of a proposed discharge that would cause or contribute to the violation of an applicable water quality or toxic effluent standard or jeopardize a listed threatened or endangered species. The Guidelines also prohibit the authorization of a proposed discharge which will cause or contribute to significant degradation of the aquatic ecosystem. Findings of significant degradation must be based upon specific factual determinations, evaluations, and tests identified in the Guidelines. These include the evaluation of direct, secondary, and cumulative effects of the proposed discharge and alternatives on specific resources including fish, wildlife, and special aquatic sites.

These Guidelines state that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. The Guidelines also state that no discharge of dredged or fill material is permitted unless appropriate and practicable steps have been taken to minimize potential adverse effects to the aquatic ecosystem. Subpart H of the Guidelines identifies many possible steps to avoid, minimize, and compensate for direct and secondary adverse impacts. Taken together, these steps form the mitigation sequence: a mandatory, sequential process undertaken to "minimize potential adverse impacts of the discharge on the aquatic ecosystem." Demonstrating compliance with the Guidelines requires identifying the appropriate and practicable steps that will be taken to avoid impacts, and then minimize and compensate for any remaining unavoidable impacts associated with discharges subject to the Guidelines.

For unavoidable impacts to wetlands, streams, and other WOTUS, the 404(b)(1) Guidelines require appropriate and practicable compensatory mitigation to offset unavoidable impacts. In 2008, the USACE and the EPA issued a final rule for Compensatory Mitigation for Losses of Aquatic Resources. This final rule contains the regulations that govern compensatory mitigation for activities that require a permit from the USACE (USACE and EPA 2008). Compensatory mitigation is defined as the restoration, establishment, enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts that remain after all appropriate and practicable avoidance and minimization has been achieved.

Section 402 of the CWA, which authorizes the National Pollution Discharge Elimination System permit program, controls water pollution by regulating point sources that discharge pollutants other than dredged and fill material into WOTUS. On June 5, 2018, EPA approved the Idaho Pollutant Discharge Elimination System Program and authorized the transfer of permitting authority to the state beginning on July 1, 2018.

3.11.2.2 Executive Order 11990

Executive Order 11990 requires that federal agencies, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands, unless the head of the federal agency trying to work in wetlands finds that: 1) no practicable alternative to such construction exists; and 2) the project would include all practicable measures to minimize harm to wetlands that may result from such use (42 Federal Register 26961, 3 Code of Federal Regulation, 1977 Comp, p. 121).

3.11.2.3 State Regulations

Projects that may result in a discharge to WOTUS require Water Quality Certification under Section 401 of the CWA. Section 401 gives states the authority to issue this certification, ensuring that the discharge complies with state water quality standards. The Idaho Department of Environmental Quality is the regulatory authority for Section 401 permitting in Idaho. The Idaho Department of Environmental Quality must grant (with or without conditions), deny, or waive Section 401 certification for any project in Idaho that requires a federal permit or license under the CWA before the federal permit or license can be issued. This Water Quality Certification is made to ensure that a proposed project would comply with state water quality standards for surface water and any other water quality requirements under state law.

The Idaho Department of Water Resources regulates stream channels under the Idaho Stream Channel Protection Act. This act requires that a Stream Channel Alteration Permit be obtained from Idaho Department of Water Resources before any type of alteration work, including removal and/or fill and installation of in-water or over-water structures with the potential to affect flow, within the beds and banks of a continuously flowing stream.

The Emergency Wetlands Resources Act of 1986 requires that states develop prioritized lists of wetlands that meet the criteria of: 1) supporting rare or declining wetland types; 2) having identifiable threats of loss or degradation of wetland functions; and 3) having diverse and important functions and values (including recreation), or especially high value for specific functions. To meet the requirements of the Emergency Wetlands Resources Act, Idaho Fish and Game (IDFG) maintains a Wetland Conservation Prioritization Plan (IDFG 2012) and a list of wetland sites in need of acquisition for long-term conservation and management.

3.11.2.4 Valley County Regulations

Valley County reviews development proposals for consistency with the County’s Land Use Development Ordinance. When permits are required by other agencies for all or parts of the application, evidence of the permit and compliance with the provisions of the permit are to be a condition of the land use approval. This includes permits to alter wetlands, permits to construct in flood prone areas, and in other situations where the review and issuance of the permit would assure the Valley County Commission that the proposal would be technically feasible.

3.11.2.5 National Forest Land and Resource Management Plans

The Payette Forest Plan and Boise Forest Plan include management direction for wetlands and riparian areas. They include guidelines for Riparian Conservation Areas, which are defined as "traditional riparian corridors, perennial and intermittent streams, wetlands, lakes, springs, reservoirs, and other areas where proper riparian functions and ecological processes are crucial to maintenance of the area's water, sediment, woody debris, nutrient delivery system, and associated biotic communities and habitat."

Aquatic resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. Desired conditions are descriptions of how forest resources should look and function to provide diverse and sustainable habitats, settings, goods, and services. Taken together, the desired conditions should present an integrated vision of a properly functioning forest that supports a broad range of biodiversity and social and economic opportunities.

The desired condition for wetland and riparian resources is described in the Payette Forest Plan (Forest Service 2003) as follows:

- "Riparian and aquatic ecosystems have appropriate types and amounts of vegetation.
- There is sufficient large woody debris that is appropriate for land and stream channel forms to maintain water quality, filter sediment, aid floodplain development, improve floodwater retention and groundwater recharge, and contribute to diverse habitat components.
- Management actions result in no long-term degradation of soil, water, riparian, and aquatic resources conditions.
- Instream flows are sufficient to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges, and provide for downstream uses.
- Wetlands and floodplains are maintained where they are properly functioning, and restored where degraded."

The desired condition for wetland and riparian resources is described in Boise Forest Plan (Forest Service 2010) as follows:

- "Ecosystems on the forest have ecological and watershed integrity, meaning they have a viable combination of all the diverse elements and processes needed to sustain the systems and perform desired functions; they are resilient and resistant to natural and human-caused disturbances.

- Streams and lakes provide clean water, appropriate temperatures, and a variety of connected habitats to support native and desired non-native aquatic species.
- Riparian plant communities are in a desired range of variability for composition, structure, patterns, and processes. Vegetation forms a diverse network of habitats and connective corridors for wildlife, and provides desired levels of snags, coarse woody material, and soil organic matter. They support species diversity, with emphasis on maintaining or restoring threatened, endangered and sensitive species, rare and unique plant communities, and species of cultural, commercial, and recreational importance.
- Riparian areas connect upland and aquatic habitats and promote stable and diverse stream channel conditions. Existing noxious weed populations are not expanding, and new invasive species are not becoming established.
- Riparian areas have their own disturbance processes that influence vegetation dynamics, with an almost continual readjustment in successional stages.
- Sufficient large woody debris that is appropriate for land and stream channel forms exists to maintain water quality, filter sediment, aid floodplain development, improve floodwater retention and groundwater recharge, and contribute to diverse habitat components.
- Instream flows are sufficient to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges and provide for downstream uses. Wetlands and floodplains are maintained where they are properly functioning and are restored where degraded."

3.11.3 Existing Conditions

This section presents an overview of general hydrologic conditions, followed by an inventory of existing wetlands, riparian resources, and wetland functions and values in the analysis area for wetlands and riparian resources. Detailed figures of wetland and riparian areas are provided in **Appendix I**.

3.11.3.1 General Hydrologic Landscape Setting

3.11.3.1.1 MINE SITE FOCUS AREA

The proposed mine site is in the Salmon River Mountains. The terrain is generally characterized by narrow valleys surrounded by steep mountains; however, previous mining activities at the mine site have altered local topography by excavating pits and storing mine tailings in the Meadow Creek Valley. Elevations in this portion of the analysis area range from 6,000 to 6,600 feet above mean sea level, with surrounding mountains reaching elevations more than 8,500 feet above mean sea level.

The main drainage basin in the mine site focus area is the EFSFSR watershed (HUC 1706020802) (**Figure 3.11-1**). The EFSFSR is joined by Johnson Creek near the village of Yellow Pine, downstream of the mine site. The proposed mine site would be in several drainages that are all tributaries to the EFSFSR, including Meadow Creek, East Fork Meadow Creek (also known as Blowout Creek), Garnet Creek, Fiddle Creek, Hennessy Creek, Midnight Creek, West End Creek, and Sugar Creek. Wetlands located on slopes and tributary drainages within and near the mine site area are associated with hillside seeps and springs (HydroGeo 2012). In most cases, these seep and spring features are hydrologically connected to a larger wetland/stream complex in the valley floor and/or a stream downslope via surface flow (HDR 2017). Snowmelt runoff and groundwater inputs also contribute to the hydrologic support of wetlands at the mine site (refer to Section 3.8.3.2, Groundwater, for more information regarding existing groundwater conditions in the SGP area).

As a result of almost a century of mining and exploration in the mine site area, numerous wetlands and streams have been altered, particularly those adjacent to former mine pits, tailing storage areas, and roads (Forest Service 1994). Previous mine operators excavated and/or filled wetlands to construct mineral processing facilities and development rock storage facilities, tailing storage facilities, mine access and haul roads, town sites, and other mining-related developments. Most of these activities occurred before enactment of the CWA in 1972 and associated mitigation requirements.

Within the mine site focus area approximately 847 acres have been modified by past human activity and are considered highly disturbed (**Appendix C**, **Table C-6**). In addition, the history of excavation and mine tailings storage at the mine site has introduced areas of soil contamination, which are often in, or adjacent to, wetlands and riparian areas (Midas Gold Idaho, Inc. [Midas Gold] 2016). Past mining-related disturbances in the mine site focus area are shown in **Figure 3.7-2,** Past Mining and Related Activities at the Mine Site. Soils in areas where vegetation is removed or disturbed are more susceptible to wind and water erosion (Forest Service 1994). As such, in disturbed areas the water quality and soil stabilizing properties of intact wetlands and riparian areas make them especially important in maintaining and improving watershed conditions. Additional detail on soil conditions at the mine site is provided in Section 3.5, Soils and Reclamation Cover Materials.

3.11.3.1.2 OFF-SITE FOCUS AREA

Proposed SGP features in the off-site focus area portion of the analysis area would cross several watersheds (**Figure 3.11-1**): Upper EFSFSR (HUC 1706020802), Johnson Creek (HUC 1706020801), Upper South Fork Salmon River (HUC 1706020804), Gold Fork River (HUC 1705012303), Big Creek North Fork Payette River (HUC 1705012305), Lake Fork-North Fork Payette River (HUC 1705012302), and Cascade Reservoir (HUC 1705012304). The Johnson Creek watershed drains to Johnson Creek, which flows northward. The Upper South Fork Salmon River watershed drains to the South Fork Salmon River, which flows northward. The Gold Fork River, Big Creek North Fork Payette River, Lake Fork-North Fork Payette River, and Cascade Reservoir watersheds all drain toward Cascade Lake.

The off-site focus area includes proposed access roads that would leave the mine site and travel west along EFSFSR, southwest along Burntlog Creek, and south along Johnson Creek towards Landmark. In these areas, wetlands along the roads include hillside seeps on slopes and valley-bottom riparian wetlands in narrow valleys (Forest Service 2010). Slope gradients range from very steep (80 percent on upper mountaintops) down to moderate (15 to 40 percent in bottomlands) (Forest Service 2010). Elevations generally decrease from south to north, ranging from 6,000 feet above mean sea level near Landmark down to 4,800 feet near the village of Yellow Pine (Forest Service 2010).

The proposed transmission line corridor would pass along hill tops located between the mine site and Johnson Creek Road (County Road 10-413). The few wetlands in this area are generally limited to wetland seeps that act as the headwaters for ephemeral and intermittent streams. From the vicinity of Landmark, an existing transmission line continues west, crossing over hills and across stream valleys in the vicinity of Warm Lake. Approaching the City of Cascade, the general topography transitions from the Long Valley foothills down to the broad, Long Valley basin around Cascade Reservoir at 4,800 feet elevation. At this western end of the off-site focus area, the main geomorphic landforms are depositional plains with slope gradients averaging between 0 to 20 percent (Forest Service 2010). Large, wide arrays of wetland and riparian habitat are located along the bottomlands surrounding the Cascade Reservoir (Forest Service 2010). In many locations, aquatic habitats have been affected by roads, livestock grazing, timber harvest, and recreational use (Forest Service 2010). Historical impacts include streambank erosion, degradation, rapid deposition of eroded sediments, and stream channel modification (Forest Service 2010). Aquatic habitat is not functioning properly in some locations within the off-site focus area due to habitat fragmentation from roads and timber harvest, high sediment levels, and impacts to riparian areas (Forest Service 2010).

3.11.3.2 Wetlands

Wetlands were identified and delineated using the methods described in Corps of Engineers Wetlands Delineation Manual (Corps Manual) (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Environmental Laboratory 2010) (HDR 2017). According to the Corps Manual, identification of wetlands is based on a three-factor approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987). Wetlands were further classified and described by their vegetation structure per the Classification of Wetlands and Deepwater Habitats (Cowardin et al. 1979) or as “Open Water.”

In **Tables 3.11-3a** and **3.11-3b**, wetlands are summarized by their Cowardin Classification for each drainage within the mine site focus area and each principal drainage in the off-site focus area. For additional discussion of wetland vegetation characteristics in the analysis area, refer to Section 3.10.3.1, Vegetation Communities; for additional discussion of hydric soil conditions in the analysis area, refer to Section 3.5.3, Soils, Existing Conditions; and for additional information on surface water hydrology, refer to Section 3.8.3, Surface Water and Groundwater Quantity, Existing Conditions. Wetlands provide important ecological functions for associated streams and rivers. For example, they may protect fish by providing habitat during high flows, or they may remove nutrients and toxicants from waters to improve water quality in streams and rivers. Further discussion of these ecological functions is provided in Section 3.11.3.4. Because of their ecological relationship with streams and rivers, the presence or absence of federally protected fish species is noted for each associated river or stream in **Tables 3.11-3a** and **3.11-3b**. This is provided to help readers understand the sensitivity of various drainages and where impacts to wetlands may result in effects to fish habitat for those species. For additional discussion of fish resources and fish habitat, refer to Section 3.12.

Table 3.11-3 Wetland Resources Identified in the Analysis Area – Mine Site and Off-site Focus Areas (Table 3.11-3a – Table 3.11-3c)

Table 3.11-3a Wetland Resources Identified in the Mine Site Focus Area

Drainage	PEM (acres)	PFO (acres)	PSS (acres)	Open Water (acres)	Total (acres)	Federally Listed Fish Present in Any Part of the Stream (Y/N and Species)[1]
East Fork Meadow Creek (“Blowout Creek”)	46.4 (0.3)	4.8	10.2	0	61.4 (0.3)	Y - CS
EFSFSR	15.1 (8.8)	8.9 (43.5)	40.0 (3.6)	4.6	68.5 (55.9)	Y – BT, CS, SH
Fiddle Creek	2.0	16.2	1.9	0.1	20.1	Y – BT, CS
Garnet Creek	4.3	1.1	5.6	0.05	11.1	N
Hennessy Creek	4.9	0.3	4.7	0.2	10.1	N
Meadow Creek	44.0	81.2	63.1	0.5	188.8	Y – BT, CS
Midnight Creek	0.5	0.9	2.0	0	3.4	N
Rabbit Creek	2.1 (0.2)	1.1	1.8	0	5.0 (0.2)	N
Sugar Creek	0.2	0	1.8	0	2.0	Y – BT, CS, SH
West End Creek	0.2	0	2.1	0	2.3	N
Mine Site Totals	119.7 (9.3)	114.5 (43.5)	133.4 (3.6)	5.4	373.0 (56.4)	N/A

Table Source: HDR 2013, 2014a,b, 2015, 2016b

Table Notes:

1 Species presence was reported in MWH 2017. For more details refer to Section 3.12, Fish Resources and Fish Habitat.

Parentheses indicate the number of acres derived from aerial photo interpretation and NWI data; numbers in parentheses are in addition to the number of acres derived from delineation data not in parentheses in the remainder of the cell.

Any apparent discrepancies between totals are due to rounding of numbers.

EFSFSR = East Fork South Fork Salmon River; PEM = palustrine emergent marsh; PFO = palustrine forested; PSS = palustrine scrub-shrub; BT = Bull trout; CS = Chinook salmon; SH = Steelhead/Redband/Rainbow trout; N/A = not applicable.

Table 3.11-3b Wetland Resources Identified in the Off-site Focus Area

Drainage	PEM (acres)	PFO (acres)	PSS (acres)	Open Water (acres)	Total (acres)	Federally Listed Fish Present in Any Part of the Stream (Y/N and Species)[1]
Beaver Creek	(4.3)		(0.9)		(5.2)	No data
Big Creek	4.7 (566.1)	0	8.9 (16.2)	0 (100.9)	13.7 (683.2)	Y – BT, CS, SH
Boulder Creek	0.4 (426.5)	0 (23.0)	0 (7.2)	0 (0.8)	0.4 (457.5)	No data
Burntlog Creek	19.1	0.4	4.8	0	24.3	Y – BT, CS, SH
Center Canal	5.9 (129.3)	0	0 (0.9)	0 (4.7)	5.9 (135.0)	No data
Curtis Creek	0.2	0.1	1.4	0	1.6	No data
EFSFSR	0.2	4.5	21.2	0	25.9	Y – BT, CS, SH
Gold Fork Canal	31.2 (116.7)	0	0	0	31.2 (116.7)	No data
Gold Fork River	3.4	0	3.4 (1.1)	0 (221.0)	6.8 (222.2)	Y – BT
Johnson Creek	4.9	7.0	41.9	0.1	53.9	Y – BT, CS, SH
Lake Fork	0.8 (15.4)	0 (72.3)	0.5	0 (0.5)	1.2 (88.2)	No
Mahala Ditch	1.1	0	0	0	1.1	No data
Meadow Creek	2.0	0	0.1	0	2.1	Y – BT, CS
No Mans Creek	4.3	5.8	0	0	10.1	No data
Profile Creek	0	0	0.1	0	0.1	Y – BT, CS, SH
Riordan Creek	46.4 (0.04)	16.6	12.9	0 (5.6)	75.8 (5.6)	Y – BT, CS, SH
Sand Creek	2.5	0	1.6	0	4.1	No data
Six-bit Creek	0.3	0	0.1	0	0.4	No data
Sugar Creek	0	0	0.02	0	0.0	Y – BT, CS, SH
Trapper Creek	10.1	6.5	17.7	0	34.4	Y – BT, CS, SH
Trout Creek	9.8	4.0	18.5	0	32.3	Y – BT
Warm Lake Creek	5.6 (23.8)	0.6 (37.5)	13.9 (14.3)	0	20.1 (75.6)	Y – BT, CS
Willow Creek	3.9	0	0	0	3.9	No data
Outside Mine Site Totals	156.8 (1,282.2)	45.4 (132.8)	147.1 (40.7)	0.1 (333.5)	349.4 (1,789.2)	N/A

Table Source: HDR 2013, 2014a,b, 2015, 2016c

Table Notes:

1 Species presence was reported in MWH 2017. For more details refer to Section 3.12, Fish Resources and Fish Habitat.

Parentheses indicate the number of acres derived from NWI data; totals numbers in parentheses are in addition to the number of acres derived from delineation data not in parentheses in the remainder of the cell.

Any apparent discrepancies between totals are due to rounding of numbers.

NA = not applicable; PEM = palustrine emergent marsh; PFO = palustrine forested; PSS = palustrine scrub-shrub; BT = Bull trout; CS = Chinook salmon; SH = Steelhead/Redband/Rainbow trout; N/A = Not Applicable.

Table 3.11-3c Wetland Resources Identified in the Analysis Area – Totals

Analysis Area	PEM (acres)	PFO (acres)	PSS (acres)	Open Water (acres)	Total (acres)
Mine Site Focus Area	119.7 (9.3)	114.5 (43.5)	133.4 (3.6)	5.4	373.0 (56.4)
Off-site Focus Area	156.8 (1,282.2)	45.4 (132.8)	147.1 (40.7)	0.1 (333.5)	349.4 (1,789.2)
Analysis Area (Total)	**276.5 (1,291.5)**	**159.9 (176.3)**	**280.5 (44.3)**	**5.4 (333.5)**	**722.4 (1,845.6)**

Table Source: HDR 2013, 2014a,b, 2015, 2016b,c

Table Notes:

1 Any apparent discrepancies between totals are due to rounding of numbers.

2 Acres provided in each cell are derived from wetland delineation studies, as available. Wetland acres were estimated for remaining portions of the wetland study area using NWI or aerial photo interpretation. These additional acres are provided in parenthesis.

PEM = palustrine emergent marsh; PFO = palustrine forested; PSS = palustrine scrub-shrub/

The following subsections present brief descriptions of wetland communities in the analysis area per Cowardin et al. (1979). Common wetland vegetation species described below are from the 2013 Wetland Resources Baseline Study (HDR 2013); for a more detailed description of the wetland vegetation communities, refer to this document.

3.11.3.2.1 PALUSTRINE EMERGENT WETLAND

The PEM wetland community is often present in large sedge meadows or associated with hillside seeps. Vegetation primarily consists of various grasses, sedges, moss, and forbs, such as swordfern rush (*Juncus ensifolius*), beaked sedge (*Carex rostrata*), Nebraska sedge (*Carex nebrascensis*), angelica (*Angelica arguta*), cow parsnip (*Heracleum lanatum*), Fendler's meadow-rue (*Thalictrum fendleri*), horsetail (*Equisetum fluviatile* and *E. hyemale*), and monkeyflower *(Mimulus lewisii* and *M. guttatus*).

3.11.3.2.2 PALUSTRINE SCRUB-SHRUB WETLAND

The PSS wetland community commonly includes alder, willow, bog birch (*Betula glandulosa*), and currant in the shrub stratum, with an herbaceous understory consisting of grasses, sedges, and forbs such as swordfern rush, beaked sedge, horsetails, and monkeyflowers. A thick moss mat is common in the wettest scrub-shrub communities (HDR 2013).

3.11.3.2.3 PALUSTRINE FORESTED WETLANDS

The PFO wetland community commonly includes Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and lodgepole pine (*Pinus contorta*) in the tree stratum (i.e., layer); alder (*Alnus* spp.), willows (*Salix boothii* and *S. drummondiana*), and currant (*Ribes* spp.) in the shrub stratum; and various wetland forbs and grasses in the herb stratum.

3.11.3.2.4 FENS

Fens are permanently saturated PSS or PEM wetlands that form where a thick layer of partially decomposed organic matter, called peat, accumulates under water-soaked conditions (at least 8 to 16 inches within the upper 31.5 inches of the soil profile). Fens receive a significant portion of their hydrologic input and nutrients from water that has percolated through mineral soil and bedrock, and because of their unique characteristics, they tend to support a diverse plant and wildlife community. Fens range from poor fens, which are acidic (pH 4.0 to 5.5) and support more bog-type species (e.g., sphagnum moss), to rich fens, which are less acidic and are dominated by sedges, other graminoids, and true mosses (IDFG 2005). Because of their rarity and tendency to support unique/rare plants, the Forest Service considers fens to be high priority conservation habitats (Williams 2018).

The wetland delineation and functional assessment surveys and reports prepared by HDR between 2011 and 2016 and amended by Tetra Tech in 2018 did not refer to any documented wetlands specifically as fens within areas surveyed. In 2017, Midas Gold reassessed the initial data collected by wetland delineators (HDR 2013, 2014a,b, 2015, 2016b,c) for the presence of fens and determined that the wetland datasheets did not indicate the presence of fens (Midas Gold 2017). However, based on the indication of peat in soils at the proposed tailings storage facility dam location and the adjacent Hangar Flats Development Rock Storage Facility in geotechnical reports prepared for the SGP (SRK 2012; Strata 2014, 2016, 2017; Tierra Group 2018), the Forest Service and USACE requested that Midas Gold reassess the sample plot datasheets from the wetland delineation surveys to determine if any wetlands encountered during those surveys had fen characteristics (e.g., appropriate geomorphic location, organic soils, prolonged near-surface water table, and associated plant species), and that Midas Gold provide a report to document the methods, data reviewed, and results of their reassessment. Midas Gold’s contractor (Tetra Tech) reviewed datasheets in the vicinity of the proposed tailings storage facility and the adjacent Hangar Flats Development Rock Storage Facility and determined that wetlands in these areas did not meet the characteristics of fens (Tetra Tech 2019). Wetland delineation datasheets for other SGP component areas were not reassessed for the presence of potential fens as part of the 2019 Tetra Tech review.

IDFG considers wetlands associated with Mud Lake, Tule Lake, and Warm Lake, to be poor fens (IDFG 2004a) (poor fens have pH levels as low as 4.0 and are low in nutrients [IDFG 2004b]). Mud Lake and its associated wetlands are designated as a Class I site under the Wetland Conservation Prioritization Plan (IDFG 2012), indicating that this area is in near pristine condition and likely provides habitat for high concentrations of state rare plant or animal species (IDFG 2004a). All these sites are within the analysis area for wetlands and riparian resources but outside of the proposed construction footprint for the SGP. Mud Lake occurs near the existing Burnt Log Road (National Forest System Road 447) and Warm Lake and Tule Lake occur south of Warm Lake Road (County Road 10-579). For this analysis, wetlands associated with Mud Lake, Tule Lake, and Warm Lake are considered fens and impacts to these areas will be assessed accordingly in Chapter 4.11, Wetlands and Riparian Resources - Environmental Consequences.

3.11.3.3 Riparian Areas

Riparian corridors are areas with distinctive soil and vegetation between a stream or other body of water and an adjacent upland, where elements of both aquatic and terrestrial ecosystems mutually influence each other (Forest Service 2003; Knutson and Naef 1997). Riparian areas often overlap with wetlands and the portions of floodplains and valley bottoms that support riparian vegetation. Vegetated riparian buffers trap sediment, shade stream corridors, provide migratory corridors for wildlife, contribute woody debris and litter to streams, improve water quality by intercepting runoff from adjacent uplands, provide important habitat for terrestrial and avian species, and stabilize streambanks to prevent erosion.

Appendix B of both the Payette Forest Plan and Boise Forest Plan provide an Aquatic Conservation Strategy, which describes the importance of riparian areas and presents a method for delineating "riparian conservation areas" (RCAs). The Boise Forest Plan notes that RCAs contribute to maintaining the integrity of aquatic ecosystems by: 1) influencing the delivery of coarse sediment, organic matter and woody debris to streams; 2) providing root strength for channel stability; 3) shading the stream; and 4) protecting water quality.

RCAs are delineated along perennial and intermittent streams, and are determined either in the field, based on professional judgement of ecological function and process or, in the absence of field data, as follows (Forest Service 2003):

- For forested streams (perennial1), the RCA is defined as the land within a buffer of 300-feet slope distance from the ordinary high water mark.
- For forested streams (intermittent), the RCA is defined as the land within a buffer of 150-feet slope distance from the ordinary high water mark.
- For non-forested streams (perennial and intermittent), the RCA is defined as the land within a buffer equal to the extent of the flood prone width, or riparian vegetation, whichever is greatest.

Perennial and intermittent streams that support riparian and/or wetland vegetation along their streambanks occur throughout the analysis area (HDR 2013) (**Figure 3.11-2**). RCAs in the analysis area are associated with all perennial and intermittent streams presented in the National Hydrography Dataset[2] mapped within the analysis area; however, stream descriptions presented below are limited to the primary drainages documented in available stream evaluations for the SGP (HDR 2016a; Rio Applied Science and Engineering 2019). The most common riparian vegetation species that have been observed surrounding drainages in the analysis area include alder, willow, currant, and red-osier dogwood (*Cornus sericea*), with an understory of various forbs and grasses, particularly in open areas not otherwise dominated by

[1] This includes intermittent streams providing seasonal rearing and spawning habitat (Forest Service 2003)

[2] The National Hydrography Dataset is a publicly accessible dataset maintained by the U.S. Geological Survey. It presents spatial information associated with the water drainage network of the United States (https://www.usgs.gov/core-science-systems/ngp/national-hydrography/national-hydrography-dataset?qt-science_support_page_related_con=0#qt-science_support_page_related_con)

shrubs (Forest Service 1994; HDR 2013). Portions of streams in the mine site focus area, and their associated riparian areas, have been affected by legacy mining-related activities (Forest Service 1994), including placement of development rock and tailings in floodplains and adjacent to streambanks, diversion of streams into rock-lined channels to move them away from mining activities, mining town sites and ore processing facilities adjacent to stream channels, and erosion from disturbed areas associated with mining (**Figure 3.7-2** Past Mining and Related Activities at the Mine Site).

The major drainages in the analysis area are described in **Table 3.11-4**.

Table 3.11-4 Major Drainages in the Analysis Area

Major Drainages	SGP Component	Threatened/ Endangered Fish Species and/or Critical Habitat Present in Any Part of the Stream[1]	Stream Description
Meadow Creek	Mine Site	**Presence-** BT, CS **Critical Habitat-** BT, CS	Meadow Creek is a major tributary to the EFSFSR that flows through a flat-bottomed valley surrounded by steep mountains. Elevations range from approximately 6,200 feet above sea level in the lower reach to over 7,500 feet in the headwaters. Meadow Creek has been heavily impacted by legacy mining-related activities, including deposition of tailings and spent heap leach ore, ore processing facilities, heap leach pads, and other infrastructure, stream relocation into a straightened riprap channel, and construction of an airstrip (Midas Gold 2016). The downstream end of the valley shows remnant effects from early mining activities, along with a large outwash feature created by a dam failure in the East Fork Meadow Creek drainage south of the site of the Meadow Creek Mine. Portions of the creek have been modified over the years to improve conditions caused by past mining operations, including the regrading and revegetation of the 2 percent gradient lower reach of the creek in 2004 and 2005. The middle reach of Meadow Creek is an engineered channel that was constructed to bypass the spent ore disposal area. The channel was lined with riprap over geotextile fabric, and is confined between reinforced/engineered slopes with a gradient of less than 2 percent. This reach has a short section with a 9 percent gradient, shallow depths, and few pools, which may be a partial fish migration barrier at low flows. The channel includes low-gradient riffles, glides (section of the stream coming out of a pool),and runs. There is no side channel development or potential large woody debris recruitment. The upper reach of Meadow Creek encompasses the headwaters downstream to the location of proposed Hangar Flats Development Rock Storage Facility. Upper Meadow Creek is confined and high gradient at the most upstream extent and low gradient and unconfined immediately upstream of the spent ore disposal area in lower Meadow Creek, transitioning from a gradient of 4 to 8 percent to 2 to 4 percent. Habitat is composed of riffles, step runs (sequence of runs separated by shorter riffle steps)., and pools. The presence of side channels in some portions provide potential for lateral channel movement in the less confined sections. Immediately upstream of the spent ore disposal area, Meadow Creek is unconfined, with a gradient less than 1 percent. The reach is composed of low-gradient riffle, step run, and pool habitat. The floodplain is active with oxbow cutoffs, side channels, and backwater features.
EFSFSR	Mine Site, McCall-Stibnite Road (County Road 50-412) (temporary access), Utilities	**Presence-** BT, SH, CS **Critical Habitat-** BT, SH, CS	This perennial headwater stream flows through most of the analysis area. The ordinary high-water mark (OHWM) is 2 to 3 feet deep by 25 to 30 feet wide. A human-made, open-water pond (approximately 4.5 acres) is located in the Yellow Pine pit. The steep cascade of the EFSFSR spilling into the pond cuts off fish passage. The stream has relatively abundant riparian vegetation, except in the vicinity of the Yellow Pine pit. Per the Payette Forest Plan, riparian vegetation in the Big Creek/Stibnite Management Area is at or near properly functioning condition, except for localized areas affected by mining, roads, and recreation.

Major Drainages	SGP Component	Threatened/ Endangered Fish Species and/or Critical Habitat Present in Any Part of the Stream[1]	Stream Description
Fiddle Creek	Mine Site, Access Roads	**Presence-** None known **Critical Habitat-** CS	Fiddle Creek is a small tributary of the EFSFSR just upstream of Midnight Creek. Habitat conditions in the creek have been impacted as a result of legacy mining operations, road construction, and culvert installation (Midas Gold 2016). Fiddle Creek also was the site of a former water storage reservoir, the construction and operation of which degraded portions of the stream. The lower reach of Fiddle Creek has an approximate 37 percent gradient where it flows into the EFSFSR, creating a complete barrier to upstream fish passage (HDR 2016a). Upstream of this barrier, Fiddle Creek retains a relatively high gradient in a relatively narrow channel, with side channels (HDR 2016a). The creek has a thick tall-shrub overstory dominated by gray alder (*Alnus incana*). The uppermost section of Fiddle Creek flattens in gradient, becoming a slower meandering stream where the reservoir formerly existed. Large amounts of large woody debris occur throughout the creek, and the dominant streambed substrate consists of boulders, large cobble, and gravel (HDR 2016a).
East Fork Meadow Creek ("Blowout Creek")	Mine Site	**Presence-** CS **Critical Habitat-** CS	The East Fork Meadow Creek (EFMC), also known as "Blowout Creek," is a tributary to Meadow Creek that has been severely impacted as a result of legacy mining- related activities and the failure of a dam that had been constructed across its stream channel (Midas Gold 2016). The dam was constructed in 1929 to supply hydroelectric power for historical milling operations. The dam failed in 1965 due to record snow melt and runoff rates, depositing large volumes of sediment into Meadow Creek, the EFSFSR, and the Yellow Pine pit lake (MWH 2017). This stream is considered to be the largest source of sediment to the EFSFSR in the analysis area. The middle reach of EFMC flows through a lateral glacial moraine that eroded during the dam failure and is still considered unstable as it continues to deposit sediments into Meadow Creek and the EFSFSR. Upstream of this middle reach, EFMC has a low-gradient pool-riffle reach flowing through a large meadow. This reach is incised and continues to headcut in response to the dam failure. There are few trees and the banks have abundant grasses. The dominant streambed material is sand and gravel (MWH 2017). The EFMC headwaters are high gradient (4 to 20 percent) with cascades, high-gradient riffle, and plunge-pool habitat. Immediately downstream of the historical dam location, the creek has a slightly steeper (8 to 20 percent) gradient, and is composed of cascade habitat. Near the confluence with Meadow Creek, the EFMC passes through a multi-thread and unconfined alluvial fan with a 4 to 8 percent gradient. Sediment from the unstable slopes immediately upstream may contribute to the formation and maintenance of this alluvial fan.
Garnet Creek	Mine Site	**Presence-** None known **Critical Habitat-**	Garnet Creek is a narrow, shallow, moderate-gradient tributary to EFSFSR approximately 0.3 mile downstream from the Meadow Creek confluence. The creek has been severely modified over the past 100 years to accommodate mining-related activities. It is still influenced by legacy mining infrastructure that was located across and adjacent to the stream channel, including portions of a town site; and is currently routed through several man- made ditches (Midas Gold 2016). Garnet Creek flows through a 85-foot-long

Major Drainages	SGP Component	Threatened/ Endangered Fish Species and/or Critical Habitat Present in Any Part of the Stream[1]	Stream Description
		CS	corrugated metal pipe culvert near its confluence with the EFSFSR that presents a partial barrier to fish (HDR 2016a).
Midnight Creek	Mine Site	**Presence-** None known **Critical Habitat-** CS	Midnight Creek is a small tributary of the EFSFSR. The lower portion of the creek is characterized as a narrow channel with extremely high gradient (approximately 90 percent) and dense overhanging vegetation. The high gradient presents a complete fish passage barrier to fish (HDR 2016a). Midnight Creek has been impacted by legacy mining activities, including open-pit mining, waste rock dumps, and road construction (Midas Gold 2016).
Unnamed Tributary ("Hennessy Creek")	Mine Site, Access Roads	**Presence-** None known **Critical Habitat-** CS	Hennessy Creek historically flowed into the EFSFSR downstream of the Yellow Pine pit lake, but it has been diverted to flow into the EFSFSR downstream of Sugar Creek. It is a narrow, low-flow stream that flows in a constructed ditch alongside McCall-Stibnite Road (County Road 50-412), and then through a subterranean section under an adjacent waste rock dump before passing through a very high-gradient reach into the EFSFSR. The creek is not expected to support upstream fish passage because of an average channel gradient of 37 percent at its mouth (HDR 2016a). Hennessy Creek is densely vegetated and shallow. The lower portion of Hennessy Creek has been significantly impacted by legacy mine-related activities, including stream diversion, road construction that buried the stream channel, and mining infrastructure (Midas Gold 2016).
Rabbit Creek	Mine Site	**Presence-** None known **Critical Habitat-** CS	This is a perennial tributary to the EFSFSR. The OHWM is 1 to 2 feet deep by 1 to 3 feet wide.
West End Creek	Mine Site, Access Roads	**Presence-** None known **Critical Habitat-** CS	This is a tributary to Sugar Creek, large portions of which are non-perennial. The OHWM is 1 to 2 feet deep by 1 to 3 feet wide. This creek has been disturbed by mining-related activities, including rock deposition into the channel, diversion into a French drain, and in-channel mining. Upstream, the banks are well vegetated and steep with a Douglas-fir overstory.

Major Drainages	SGP Component	Threatened/ Endangered Fish Species and/or Critical Habitat Present in Any Part of the Stream[1]	Stream Description
Sugar Creek	Mine Site	**Presence-** BT, SH, CS **Critical Habitat-** BT, SH, CS	Sugar Creek, a tributary to the EFSFSR, enters the river downstream of the Yellow Pine pit lake. It has a relatively low-gradient. An officially closed, but still locally used, road closely parallels Sugar Creek for nearly 2 miles before crossing the creek. This road may confine the movement of Sugar Creek, specifically in areas where the banks are bound with riprap rock material. Much of Sugar Creek has large aggregates of large woody debris. The dominant substrates are sand, gravel, and cobble. This creek has widened channels, and excessive medial and lateral bar formation in response to past sediment inputs. In the 1940s, approximately 1 million cubic yards of glacial overburden was removed from the EFSFSR channel, and placed in both Sugar Creek and other parts of the EFSFSR (Kuzis 1997).
Burntlog Creek	Access Roads	**Presence-** BT, SH, CS **Critical Habitat-** BT, SH, CS	This is a perennial tributary to Johnson Creek. The OHWM of crossings ranges from 2 to 3 feet deep and 25 feet wide to many small tributaries that are 0.5 feet deep and less than 3 feet wide. Burntlog Creek is a moderate-gradient stream that occupies a steep valley floor in its upper reaches and parallels Johnson Creek at its base. Woody debris is common in the upper reaches due to extensive burns in this area. Overhead canopy is minimal.
Johnson Creek	Access Roads; Existing Transmission Line	**Presence-** BT, SH, CS **Critical Habitat-** BT, SH, CS	This is a perennial tributary to the EFSFSR. The OHWM is 30 to 50 feet wide and up to 4 feet deep.
Riordan Creek	Access Roads; New Transmission Line	**Presence-** BT, SH, CS **Critical Habitat-** BT, SH, CS	This is a tributary to Johnson Creek. Riordan Lake, which was formed as a result of a large glacial landslide that dammed the creek, is located halfway down the creek. Upstream reaches of Riordan Creek are low-gradient and downstream reaches are high-gradient.

Major Drainages	SGP Component	Threatened/ Endangered Fish Species and/or Critical Habitat Present in Any Part of the Stream[1]	Stream Description
Trapper Creek	Access Roads; Existing Transmission Line	**Presence-** BT, SH, CS **Critical Habitat-** BT, SH, CS	This is a moderate gradient tributary to Johnson Creek.

Table Source: Forest Service 2003, 2010; HDR 2012, 2013a, 2014a,b, 2015, 2016a,b; Midas Gold 2016; MWH 2017; Rio Applied Science and Engineering 2019

Table Notes:

1 Species presence was reported in MWH 2017. For more details refer to Section 3.12, Fish Resources and Fish Habitat.

EFSFSR = East Fork South Fork Salmon River, OHWM = ordinary high water mark.

BT = Bull trout, CS = Chinook salmon, SH = Steelhead/Redband/Rainbow trout.

3.11.3.4 Wetland Functions and Values

This section summarizes the wetland functional assessments that have been conducted in the analysis area (watershed condition indicators, which include stream function, are documented in Section 3.12, Fish Resources and Fish Habitat). Wetland functions are self-sustaining properties of a wetland ecosystem that exist in the absence of societal values and relate to ecological significance without regard to subjective human values. Flood attenuation and provision of off-channel fish habitat are examples of wetland functions. Wetland values are those elements of a wetland that are valued by humans, such as flood hazard reduction or recreational/hunting uses (Berglund and McEldowney 2008). Wetland functions and values were assessed to evaluate the condition of existing wetland resources so that the potential impacts of activities associated with the SGP can be understood and disclosed (Section 4.11).

Wetland functions and values were assessed by HDR using the Montana Wetland Assessment Method (MWAM) (Berglund and McEldowney 2008), and the results are summarized in the Wetland Functional Assessment Report (HDR 2016a). Functions typically provided by wetlands include, but are not limited to: sediment retention; nutrient removal; flood protection; shoreline stabilization; groundwater recharge; streamflow maintenance; thermoregulation (i.e., temperature regulation) for streams; and habitat for aquatic species, including federally protected fish and wildlife (Berglund and McEldowney 2008). The MWAM was developed by the Montana Department of Transportation to assess and summarize wetland functions and values in a manner allowing comparison of wetland gains and losses in association with impact and mitigation proposals. The use of the MWAM method has been approved by USACE for use in CWA Section 404 permitting for the proposed SGP.

In March 2018, Tetra Tech updated the 2016 HDR wetland functional assessment by adding consideration of Idaho state-ranked plant and wildlife species and including the MWAM scores for additional wetland areas that were delineated after completion of the original 2016 functional assessment (Tetra Tech 2018).

The MWAM ranks wetland functions in four categories: I through IV, with Category I having the highest functional value. Descriptions of relevant categories are as follows (Berglund and McEldowney 2008):

- Category I wetlands are of exceptionally high quality and generally are rare to uncommon in the state or are important from a regulatory standpoint. They can provide primary habitat for sensitive species, represent a high-quality example of a rare wetland type, provide irreplaceable ecological functions, and/or exhibit high flood attenuation capability, or are assigned high ratings for most assessed values and functions.
- Category II wetlands are those that provide habitat for sensitive plants or wildlife, function at very high levels for wildlife/fish habitat, are unique in a given region, or are assigned high ratings for many of the assessed functions and values but are more common than Category I wetlands.

- Category III wetlands are common and generally are less diverse than Category I and II wetlands. They can provide many functions and values, although they may not be assigned high ratings for as many parameters as are Category I and II wetlands.
- Category IV wetlands generally are small, isolated, and lack vegetative diversity. These sites provide little in the way of wildlife habitat and often are indirectly disturbed.

Per the assessments conducted by HDR and Tetra Tech, 10 of the 44 evaluated wetland AAs rated as Category IV, 27 rated as Category III, and 7 rated as Category II (HDR 2016a; Tetra Tech 2018).

Depending on the specific wetland being evaluated, up to 11 functions/values can be evaluated for each AA using MWAM (Berglund and McEldowney 2008), including the following:

- Habitat for federally listed or proposed threatened or endangered plants or animals: Whether or not an AA is known to or suspected to function as habitat for species receiving protection under provisions of the Endangered Species Act.
- General wildlife habitat: The general potential to provide wildlife habitat based on evidence of wildlife use and existence of generally desirable habitat features.
- General fish habitat: The general fish habitat quality. This function is assessed only if the AA is used by fish or if the existing situation is correctable such that the AA could be used by fish (e.g., fish use is blocked by inaccessible culvert or another barrier).
- Flood attenuation: The capability of wetlands in the AA to slow and disperse the potentially hazardous flow energy during high-water or flood events. This parameter only applies to AAs that occur within or contain a discernable floodplain.
- Long- and short-term surface water storage: The potential of the AA to capture, retain, and make available surface water originating from flooding, precipitation, upland surface (sheetflow) or subsurface (groundwater) flow.
- Sediment/nutrient/toxicant retention and/or removal: The ability of the AA to retain sediments and retain and remove excess nutrients and toxicants. This function is sometimes referred to as “water quality improvement.” This parameter only applies to wetlands with potential to receive sediments and excess nutrients or toxicants through influx of surface water, groundwater, or direct input.
- Sediment/shoreline stabilization: The ability of an AA to dissipate flow or wave energy, reducing erosion. This function is only assessed if a wetland within an AA occurs on the banks for a river, stream, or other natural or manmade channel, or occurs on the shoreline of a standing water body that is subject to wave action.
- Production export/terrestrial and aquatic food chain support: The potential of an AA to produce and export food and/or nutrients for both terrestrial and aquatic organisms.
- Groundwater discharge/recharge: The potential for groundwater discharge and recharge at the AA.

- Uniqueness: The general uniqueness of an AA in terms of its replacement potential and habitat diversity, relative abundance in the same major watershed basin, and degree of human disturbance.
- Recreation/education potential: The general potential of an AA to support recreation or education activities.

Assessed wetlands at the mine site generally exhibit moderate to high levels of disturbance from historic mining activity, erosion, and fire. They do not support known populations of ESA-listed threatened or endangered plant species (HDR 2013, 2014a,b; Tetra Tech 2018); however, potential habitat and occurrences of Forest Service Sensitive and Forest Watch plant species do occur in wetlands near the SGP (refer to Section 3.10.3.2.2, Sensitive and Forest Watch Species).

Many of these wetlands were noted during surveys as having the potential to provide habitat for a variety of wildlife species managed by the Forest Service because of their sensitivity, including northern leopard frogs, fishers, boreal owls, western toads, black-backed woodpeckers, goshawks, and wolverines (Tetra Tech 2018). Wetlands rated as Category II generally received high scores due to the provision of habitat associated with sensitive species with potential to occur in the area.

Wetlands on slopes, generally resulting from groundwater seepage, function to deliver water, sediment, and nutrients to valley bottom wetlands below. These typically exhibit less water filtration or flood storage functions because water moves through these wetlands without being detained. However, they often provide valuable habitat for terrestrial species and they can contribute cool water to wetlands and streams in the valley bottoms.

Wetlands located along valley bottom drainages, both on and off the mine site, have the potential to provide water quality, flood storage, and fish habitat functions. These streamside wetlands filter flowing water during high flow events when water is most likely to contain fine sediments that can be harmful to fish. Given the history of mining activity and historical tailings deposits at the mine site, these water quality functions are an important aspect of stream health, both at, and downstream, of the mine site. During high flows, streamside wetlands also provide off-channel refuge for small fish that seek such areas when currents in the main channel become too strong for them.

A summary of the primary functions provided within each AA and the functional assessment scores for each AA can be found in **Appendix I-1** (**Table I-1**).

3.12 FISH RESOURCES AND FISH HABITAT

3.12.1 Introduction, Scope of Analysis, and Terminology

Section 3.12 describes the fish resources and fish habitats in the analysis area of the proposed Stibnite Gold Project (SGP) under existing (baseline) physical, chemical, and environmental conditions. Section 4.12 evaluates potential environmental impacts to these fish resources and habitats from the SGP.

While all fish species are of management interest, four special status salmonids (i.e., fish in the family Salmonidae, which includes salmon,trout, and whitefish) are of particular resource management interest because of their status as federally-listed fish or fish of management concern to the United States Forest Service (Forest Service) or State of Idaho. Of the four fish species, three are federally-listed as threatened species under the Endangered Species Act (ESA): summer Chinook salmon, Snake River Basin steelhead trout, and Columbia River bull trout. Also, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan) (Forest Service 2003) has designated bull trout as a Management Indicator Species. The Forest Service defines Management Indicators as plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent (Forest Service Manual 2620.5-1; 47 Federal Register 433037, 1982). The Forest Service (Intermountain Regional Forester) has identified the westslope cutthroat trout as a Forest Service sensitive species.

For the purposes of this Environmental Impact Statement (EIS), the “analysis area” for fish resources and fish habitat is synonymous with the “action area” as defined by the ESA (50 Code of Federal Regulations [CFR] 402.02). The analysis area encompasses all areas in which fish resources and fish habitat may be affected directly or indirectly by the SGP, and not merely the immediate area involved. The analysis area is located in the South Fork Salmon River hydrological subbasin and the North Fork Payette River hydrological subbasin as illustrated on **Figure 3.12-1**. SGP-related facilities potentially located within these two subbasins would include buildings, tailings and waste rock storage facilities, access roads, electrical substations, transmission lines, and mining operational areas.

Terminology

To aid the reader in understanding the different analyses that were conducted, it is important to first define the various scales of hydrologic terminology used in this EIS. As such, the following hydrological hierarchy definitions are provided. Hydrologic unit codes (HUCs) are used to identify all of the drainage basins in the United States in a nested (hierarchical) arrangement from the largest to smallest drainage basins. In the SGP analysis area the hydrologic units of relevance are, from largest to smallest:

- Salmon River “Basin” (HUC 170602) and Middle Snake-Boise “Basin” (HUC 170501);
- South Fork Salmon River “Subbasin” (HUC 17060208) and North Fork Payette River “Subbasin” (HUC 17050123);
- Numerous “Watersheds” within each subbasin (i.e., Upper East Fork Salmon River Watershed (HUC 1706020804); and
- Numerous “Subwatersheds” within each watershed (i.e., Headwaters East Fork South Fork Salmon River Subwatershed (HUC 170602080201). Subwatersheds are sometimes referenced as “6th field” or “HUC 12” due to the 12-digit numerical code assigned to each.

Within these hydrologic units various data collection efforts were conducted over a number of years on a variety of fish resource topics that are presented in this EIS. Smaller measurement units, for example, stream “reaches” and data collection “sites” or “locations” are cited in this section and are illustrated by figures mapping the geographic locations of these smaller units. The physical footprint of the proposed SGP where mining is proposed (i.e., the proposed “mine site” footprint) occurs within two subwatersheds: Headwaters East Fork South Fork Salmon River and Sugar Creek. These two subwatersheds are labeled numbers **5** and **6** on **Figure 3.12-1**. Immediately downstream of these two subwatersheds is the adjacent No Mans Creek-East Fork South Fork Salmon River subwatershed that also is discussed in this section (HUC 170602080206), which is labeled number **4** on **Figure 3.12-1**. This latter subwatershed is within the analysis area, but not within the proposed mine site.

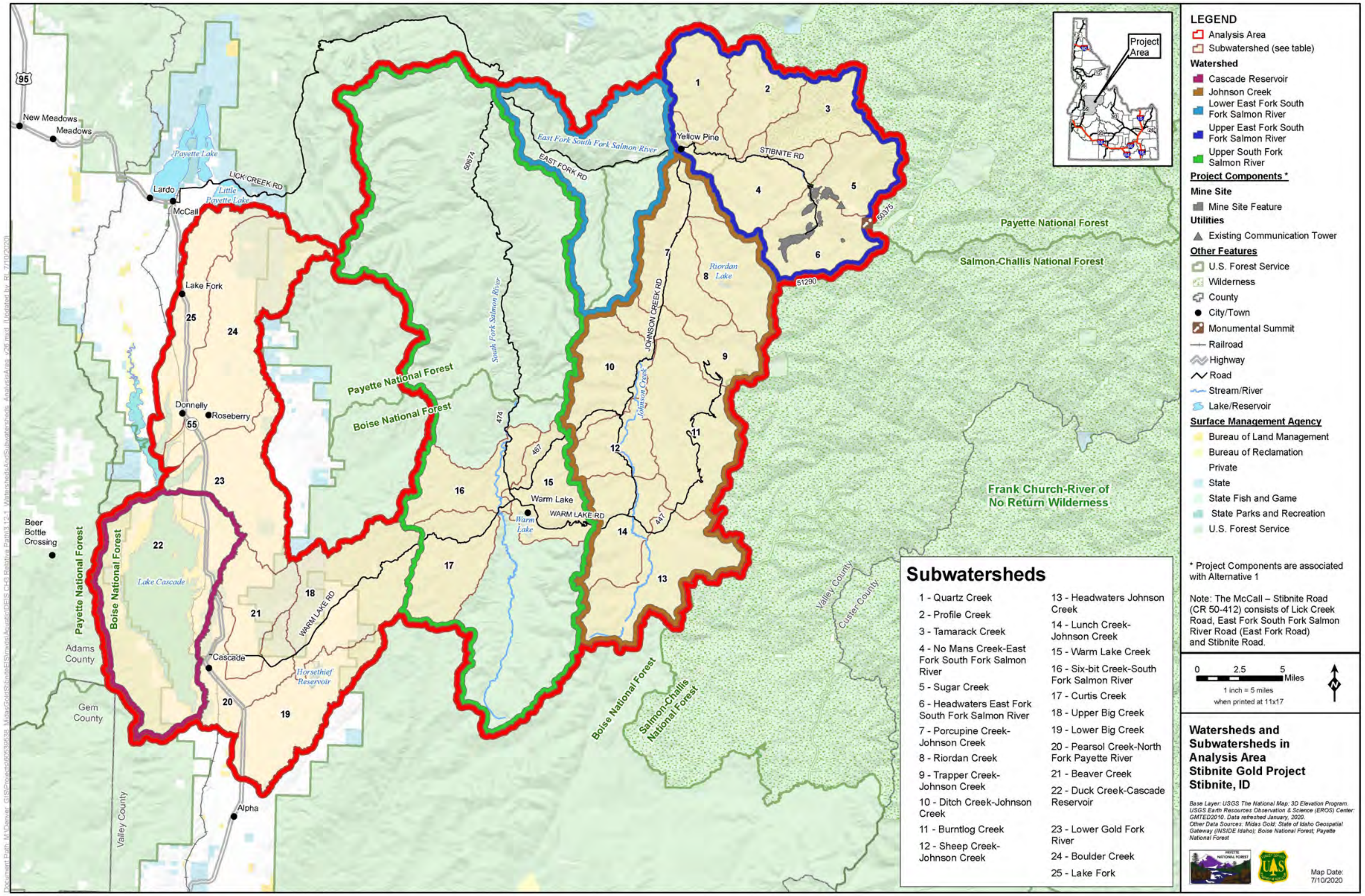

Figure Source: AECOM 2020

Figure 3.12-1 Watersheds and Subwatersheds in Analysis Area

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Within the two subwatersheds that comprise the proposed mine site, stream “reaches” (called stream segments in several Ecosystem Sciences technical memoranda included in **Appendix J**) are identified in the descriptions of existing conditions. This EIS uses the hydrological term reach in lieu of segment. The term reach is often used by hydrologists when they are referring to a small section of a stream or river between two geographic points, rather than a stream’s or river’s entire length. As used here, the term reach has been expanded to include all tributary drainages between the beginning and end of each reach. Each reach is; therefore, a smaller micro-subwatershed that is convenient for affected environment description and impact anyslysis purposes at a large spatial scale. For the two Headwaters East Fork South Fork Salmon River and Sugar Creek subwatersheds illustrated on **Figure 3.12-1**, six reaches or micro-subwatersheds are identified in various technical reports. These reaches are discussed individually in greater detail in Section 3.12, which are shown on **Figure 3.12-2** and include:

1) Stream Reach 1: East Fork South Fork Salmon River (EFSFSR) and tributaries from Sugar Creek upstream to Meadow Creek;
2) Stream Reach 2: Meadow Creek and East Fork Meadow Creek;
3) Stream Reach 3: EFSFSR upstream of Meadow Creek;
4) Stream Reach 4: EFSFSR between Sugar Creek and Profile Creek. (not part of the proposed mine site subwatersheds);
5) Stream Reach 5: Headwaters EFSFSR subwatershed (the combination of Stream Reaches 1, 2, and 3); and
6) Stream Reach 6: Sugar Creek.

The six stream reaches illustrated in **Figure 3.12-2** are located within and adjacent to the footprint of the proposed mine site.

The analysis area for fish resources also includes all of the watercourses (i.e., streams and rivers) and waterbodies (i.e., lakes, reservoirs) in the 12-digit HUC subwatersheds that overlap the proposed SGP area (**Figure 3.12-1**). Because the majority of the activities and disturbance would occur at the mine site, which is located in the South Fork Salmon River subbasin, greater emphasis is placed on describing the affected environment within this subbasin in the EIS. However, relevant habitat conditions in other subbasins, watersheds, and subwatersheds that may be impacted by proposed SGP activities also are described, as appropriate.

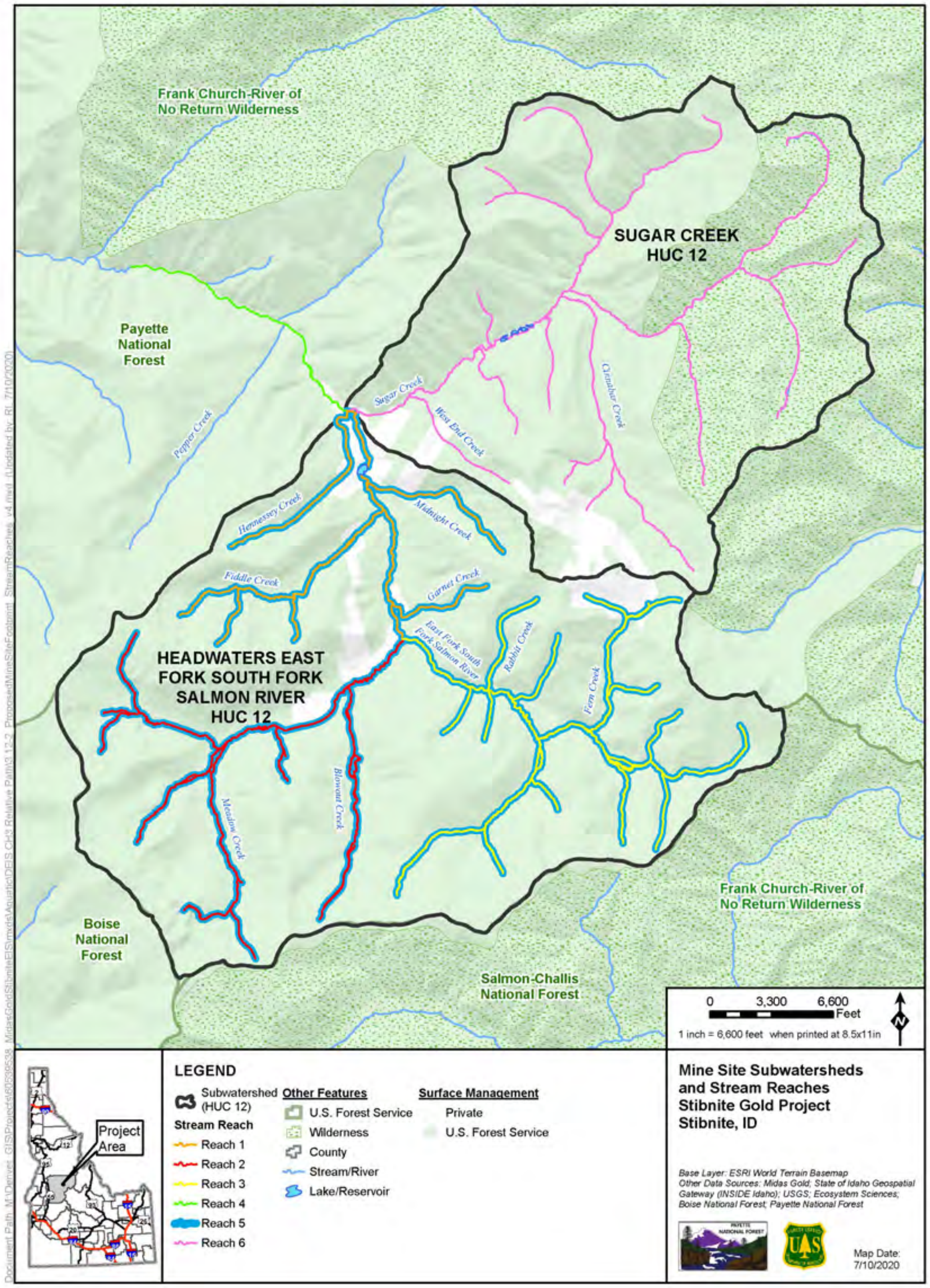

Figure Source: AECOM 2020

Figure 3.12-2 Mine Site Subwatersheds and Stream Reaches

3.12.2 Relevant Laws, Regulations, Policies, and Plans

3.12.2.1 Federal

3.12.2.1.1 U.S. Army Corps of Engineers 404 Permit

Under Section 404 of the Clean Water Act (33 United States Code [USC] 1344), a Department of the Army, U.S. Army Corps of Engineers permit is required for the discharge of dredged and/or fill material into “waters of the United States”. This would include discharges of dredge and/or fill material associated with activities, such as the construction of road crossings, water diversions, waste rock disposal in a stream, and other facilities associated with the SGP’s construction, operation, and closure and reclamation. See Section 3.11.2.1, Clean Water Act in Wetlands and Riparian Resources Affected Environment, for additional detail regarding the Clean Water Act.

3.12.2.1.2 Endangered Species Act Section 7 Consultation

Section 7 of the ESA (16 USC 1531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS or National Oceanic and Atmospheric Administration [NOAA] Fisheries), collectively known as “the Services”, which share regulatory authority for implementing the ESA. Federal agencies must submit a consultation package for proposed actions that may affect ESA-listed species, species proposed for listing, or designated critical habitat for such species. The USFWS generally manages ESA-listed terrestrial and freshwater plant and animal species, while NOAA Fisheries is responsible for marine species, including anadromous fish.

“Critical habitat” is defined by the ESA as specific areas within the geographical area occupied by listed species at the time of listing that contains the physical or biological features essential to conservation of the species and that may require special management considerations or protection (50 CFR 424). Critical habitat also may include specific areas outside the geographical area occupied by the species, if the agency determines that the outside area itself is essential for conservation.

The first step in the consultation process is an “informal” consultation with one or both of the Services to initially determine if the proposed action is likely to affect any listed species, species proposed for listing, or designated critical habitat in the analysis area. The federal agency taking the action or the “action agency” (i.e., the Forest Service and the U.S. Army Corps of Engineers in the case of the proposed SGP) may prepare a Biological Assessment (BA) to aid in determining a project’s effects on listed or proposed species, or designated critical habitat. If the action agency determines that the action is likely to adversely affect ESA-listed or proposed, species or designated critical habitat, then the action agency enters into “formal” consultation. The USFWS and/or NOAA Fisheries then prepare(s) a Biological Opinion (jointly or separately, if both Services are involved with the project) and determines whether the action is likely to jeopardize the continued existence of the species or adversely modify designated critical habitat. If there is any anticipated “incidental take” (see 50 CFR 402.02 [defining “take”]) of a species, one or both of the Services must issue an Incidental Take Statement that includes terms and conditions and reasonable and prudent measures that must be followed to eliminate or minimize impacts to the species or its designated critical habitat.

3.12.2.1.3 Essential Fish Habitat Evaluation

NOAA Fisheries is responsible for protecting habitats important to federally managed marine species, which include anadromous Pacific salmon that occur in the SGP analysis area. Federal agencies must consult with NOAA Fisheries concerning any action that may adversely affect “Essential Fish Habitat” (EFH) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act and its regulations (50 CFR 600). The Act defines EFH as habitats necessary to a species for spawning, breeding, feeding, or growth to maturity (NMFS 2002), which includes marine and riverine migratory corridors, spawning grounds, and rearing areas of Pacific salmon species. Given the SGP’s geographic location, Chinook salmon (*Oncorhynchus tshawytscha*) is the only species that has designated EFH within the SGP analysis area. As defined by the regulations, EFH includes “all streams, estuaries, marine waters, and other waterbodies occupied or historically accessible to Chinook salmon in Washington, Oregon, Idaho, and California” (50 CFR 660.412(a)). EFH is coincident with designated critical habit for Chinook salmon within the analysis area.

3.12.2.1.4 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires that federal agencies consult with the USFWS, the NMFS, and State wildlife agencies for activities that affect, control, or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with National Environmental Policy Act, Section 404 of the Clean Water Act, or other federal permit, license or review requirements.The Fish and Wildlife Coordination Act provides that wildlife conservation shall receive equal consideration and be coordinated with other features of a project.

The term “wildlife resources” is explicitly defined to include “birds, fishes, mammals, and all other classes of wild animals and types of aquatic and land vegetation upon which wildlife is dependent” (16 USC 666 (b)). Further, the Fish and Wildlife Coordination Act states that reports determining the possible damage to wildlife resources and an estimation of wildlife loss shall be made an integral part of any report prepared or submitted by the action agency with permitting authority (16 USC 662 (b), (f)).

3.12.2.1.5 National Forest Land and Resource Management Plans

The proposed SGP analysis area overlaps with the boundaries of the Payette National Forest (PNF) and the Boise National Forest (BNF). Portions of the BNF are administratively managed by the PNF due to location. Forest Service regulations and the Forest Land and Resource Management Plans for Payette National Forest (Forest Service 2003) and Boise National Forest amended Forest Plan (Forest Service 2010a) provide guidance on resource management on National Forest System lands. The proposed SGP is located in PNF Management Area 13

(Big Creek/Stibnite) and in BNF Management Areas 17 (North Fork Payette River), 19 (Warm Lake), 20 (Upper Johnson Creek), and 21 (Lower Johnson Creek), which are described in the respective Forest Plans. In addition, Appendix B of both the Payette and Boise Forest Plans provides National Environmental Policy Act guidance with respect to evaluating the ecological functionality of aquatic resources in the analysis area using Watershed Condition Indicators (WCI) under existing baseline conditions because they may be affected by the proposed SGP.

3.12.2.2 State of Idaho

3.12.2.2.1 Idaho Department of Water Resources – Stream Channel Protection Program

The Idaho Stream Channel Protection Act (Idaho Code Title 42, Chapter 38) requires that the stream channels of the state and their environments be protected against alteration for the protection of fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, and water quality. The Idaho Stream Channel Protection Act applies to any type of alteration work done inside the ordinary high water mark of a continuously flowing stream and requires a stream channel alteration permit from Idaho Department of Water Resources (IDWR) before commencing any work that would alter the stream channel. This means that the IDWR must approve, in advance, any work that is conducted within the beds and banks of continuously flowing streams (i.e., perennial streams). Stream channel alteration permitting requires a joint-permit application process with IDWR, the Idaho Department of Lands, and the U.S. Army Corps of Engineers.

3.12.2.2.2 Idaho Department of Fish and Game – Scientific Collection Permit and Fish Tranport Permit

The Idaho Department of Fish and Game (IDFG) requires a Scientific Collection Permit for any handling of fish that is not related to sportfishing with a state fishing license. The salvage and transport of fish by vehicle between capture and release sites for the proposed SGP is expected to require a fish transport permit.

3.12.3 Methodology

3.12.3.1 Information Sources

The Fish Resources and Fish Habitat Affected Environment is a summary of the available data that was compiled for specific watersheds/subwatersheds and individual species (Chinook salmon, steehead trout, bull trout, and westslope cutthroat trout). Data was obtained and modeled using various sources and consisted of different metrics, such as the watershed condition indicator (WCI). Species-specific descriptions are provided in Sections 3.12.4.2 through 3.12.4.5 and WCIs are described in Section 3.12.4.7, Watershed Condition Indicators. The information used to describe the existing condition of fish and fish habitat in the analysis area was gathered from numerous sources, including federal and state resource agencies, the Nez Perce Tribe, and Midas Gold Idaho, Inc. (Midas Gold). **Table J1-5** in **Appendix J-1**

(Supplemental Information) provides a list of fish and stream habitat data collected in the analysis area between 1991 and 2018.

The Midas Gold baseline data are described in the following documents:

- Surface Water Hydrology Baseline Study (HydroGeo Group [HydroGeo] 2012);
- Aquatic Resources 2016 Baseline Study (Montgomery Watson Harza Global [MWH] 2017 [acquired by Stantec, Inc. {Stantec} in 2016]);
- Aquatic Resources 2016 Baseline Study Addendum Report (GeoEngineers, Inc. [GeoEngineers] 2017);
- Surface Water Quality Baseline Study (HDR, Inc. [HDR] 2017);
- Supplemental Stream and Wetland Baseline Data Report for the Stibnite Gold Project (Great Ecology 2018);
- 2017 Aquatics Baseline Study for the Stibnite Gold Project (Stantec 2018);
- Final 2018 Yellow Pine Pit Fish Monitoring Summary (Brown and Caldwell 2019a);
- Final 2019 Yellow Pine Pit Lake Fish Sampling Summary (Brown and Caldwell 2020a); and
- 2018 environmental DNA (eDNA) Sampling at Burntlog Route and Mine Site (Midas Gold 2019b).

Additional data used to describe the existing conditions came from computer simulation modeling exercises that Midas Gold conducted to both describe the existing conditions and to predict any changes caused by the proposed SGP. The modeling data are described in the following documents:

- Stream and Pit Lake Network Temperature Model Existing Conditions Report (Brown and Caldwell 2018a);
- Hydrologic Model Existing Conditions Report (Brown and Caldwell 2018b);
- Site-Wide Water Chemistry Existing Conditions Technical Memo (SRK Consulting 2017);
- Stibnite Gold Project Water Quality Summary Report 2012-2017 (Midas Gold 2019a);
- Stream Functional Assessment (HDR 2016);
- Stream Functional Assessment Report for the Stibnite Gold Project (Rio Applied Science & Engineering [Rio ASE] 2019a); and
- Stream Functional Assessment Ledger (Rio ASE 2019b).

To further describe the existing condition of habitat in the analysis area for special status fish species, additional modeling was performed and the studies and outcomes are described in the following technical memoranda which are included in **Appendix J**:

- Stream Temperature Technical Memorandum – **Appendix J-2**;
- Barriers Technical Memorandum – **Appendix J-3**;
- Intrinsic Potential Modeling for Chinook Salmon and Steelhead Existing Conditions Technical Memorandum – **Appendix J-4**;
- Chinook and Steelhead Streamflow/Productivity Analysis Technical Memorandum – **Appendix J-5**;
- Chinook Salmon Critical Habitat Technical Memorandum – **Appendix J-6**;
- Occupancy Modeling for Bull Trout and Cutthroat Trout Technical Memorandum – **Appendix J-7**;
- Physical Habitat Simulation System (PHABSIM) Technical Memorandum – **Appendix J-8**; and
- Bull Trout Use of Lake Habitat Technical Memorandum – **Appendix J-9**.

In addition, various other data sources were used to describe the existing conditions. For instance, fisheries distribution and eDNA data were obtained from the Forest Service; stream gage data were obtained from the U.S. Geological Survey (USGS); water quality information was provided by the Idaho Department of Environmental Quality (IDEQ); the Nez Perce Tribe provided status and monitoring reports, database records, and redd count data; and the IDFG provided fisheries technical reports, management plans, and historical supplementation (i.e., fish translocation) records.

3.12.3.2 Midas Gold Baseline Data Collection

The following narratives provide a summary of the baseline data collected during field investigations conducted from 2012 to 2019 specifically for the SGP. **Figures 3.12-3** and **3.12-4** show the locations of fish occurrence and habitat surveys conducted by both Midas Gold and the Forest Service. Please refer to **Appendix J-1** (Supplemental Information) for additional details on sampling methods and protocols, available information on fish and fish habitat data within the analysis area, and the watercourses surveyed for various fish and fish habitat parameters in the analysis area.

3.12.3.2.1 Fish Community

Information regarding the fish community was collected using sampling techniques that included snorkel surveys, electrofishing, videography, and eDNA sampling (MWH 2017; Stantec 2018). **Figure 3.12-3** shows the location of these surveys. For eDNA sampling, water samples were collected and eDNA was analyzed for the presence of select fish species. The fish sampling also included estimating fish relative abundance (GeoEngineers 2017), conducting an investigation of fish tissue for metals concentrations, and collecting fish tissue for DNA analysis.

3.12.3.2.2 FISH PHYSICAL HABITAT

Field investigations to characterize existing aquatic physical habitat in the analysis area were performed between 2012 and 2018 (Great Ecology 2018; HDR 2016; Rio ASE 2019a,b; MWH 2017; Stantec 2018). **Figure 3.12-4** shows the location of the surveys. These investigations collected information on aquatic habitat parameters, such as water temperature, substrate size, substrate embeddedness, and surface fines.

Surveys conducted by MWH (2017) typically included a PNF-modified protocol for the PACFISH/INFISH Biological Opinion (PIBO) (Henderson et al. 2005). These surveys collected information on stream habitat conditions, such as bankfull width[1], wetted width[2], bank stability, sediment size, stream gradient, pool dimensions, and large woody debris. HDR (2016) also conducted geomorphic and stream functional assessments of the same streams targeted for the PIBO surveys.

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[1] Bankfull width describes the horizontal distance where water fills the channel just before beginning to spill onto the flood plain.

[2] Wetted width (or wetted perimeter) is the portion of the channel that is “wet.” It is formally defined as the width plus twice the depth that the water touches.

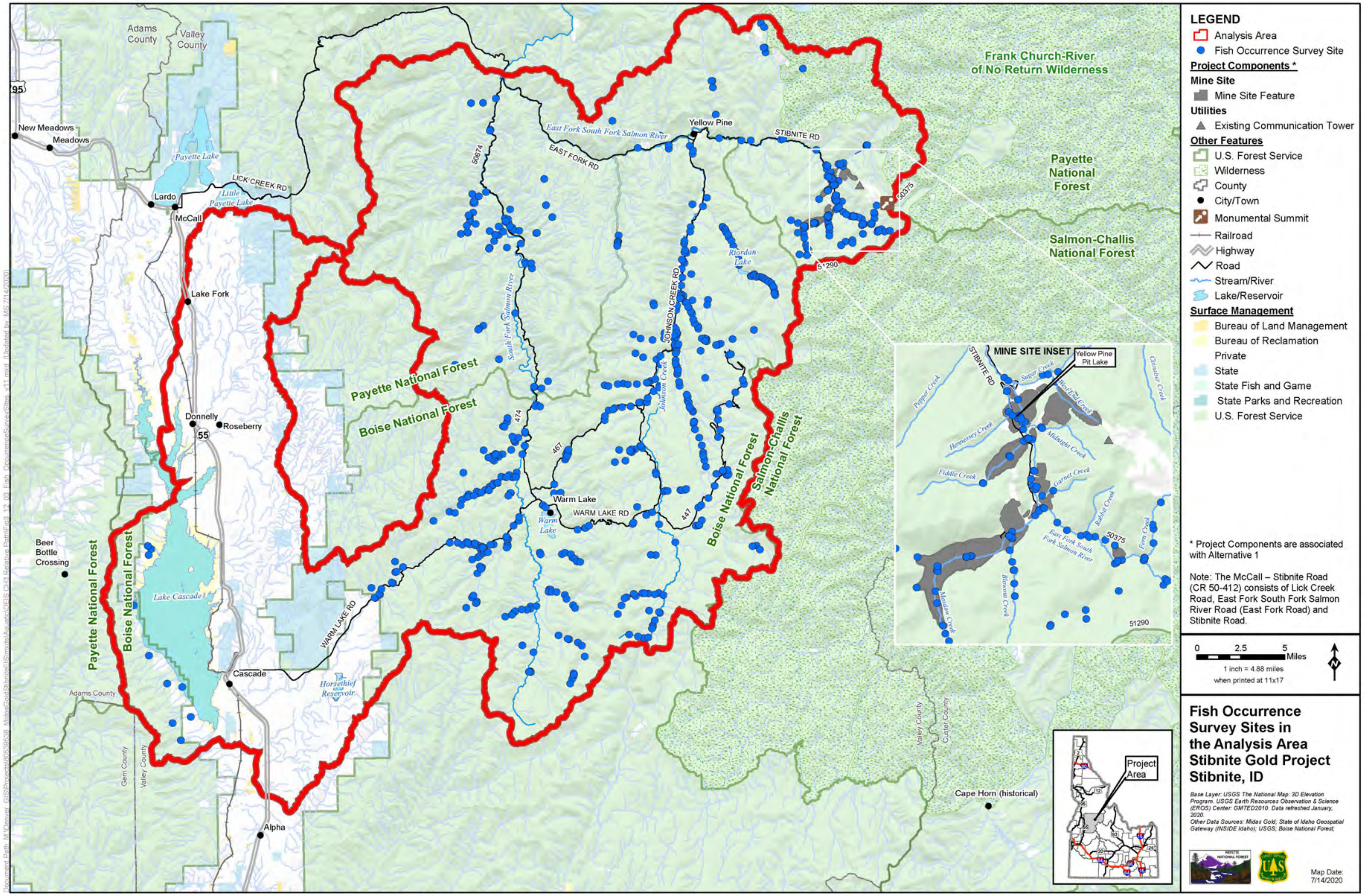

Figure Source: AECOM 2020

Figure 3.12-3 Fish Occurrence Survey Sites in the Analysis Area

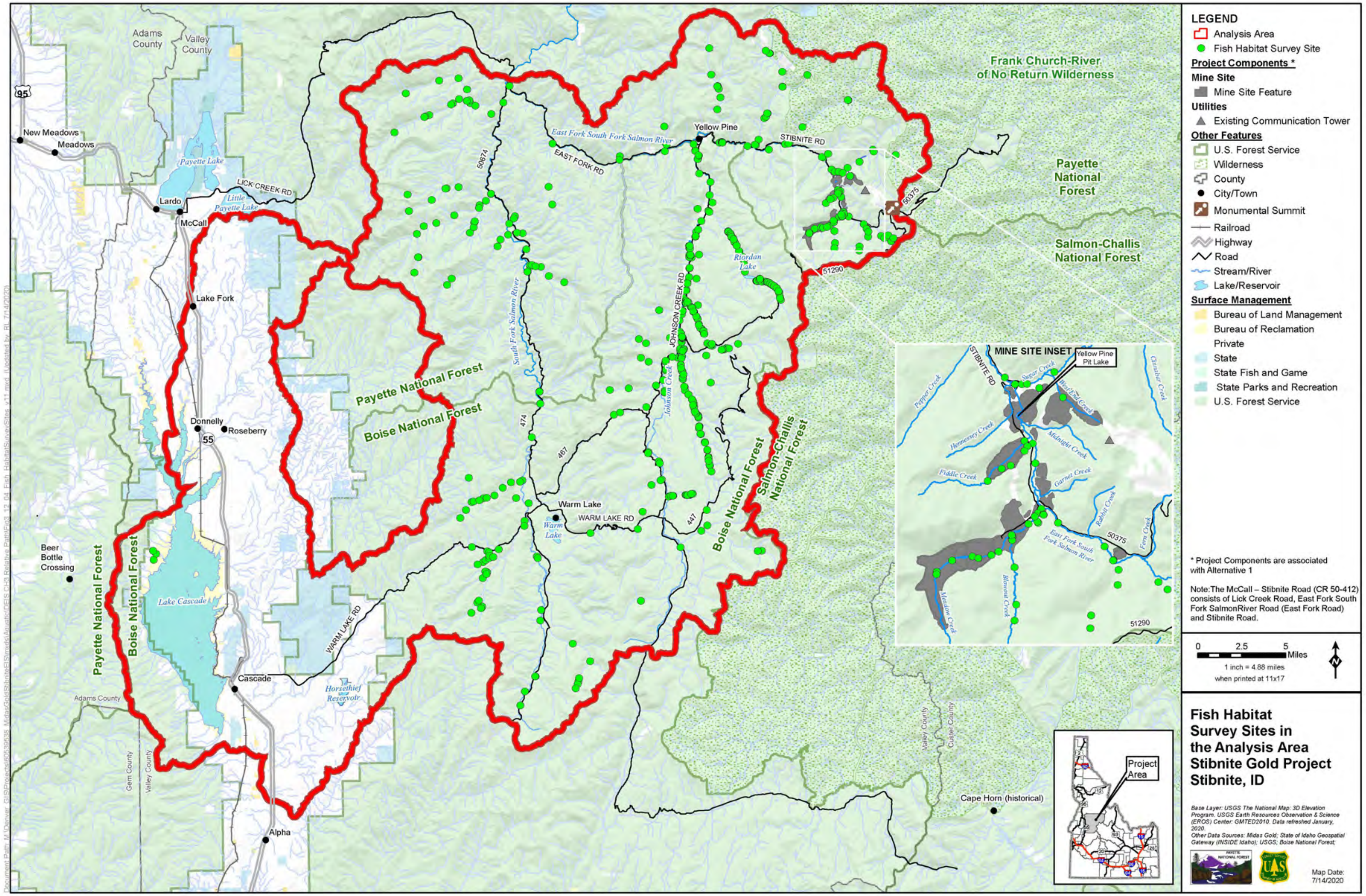

Figure Source: AECOM 2020

Figure 3.12-4 Fish Habitat Survey Sites in the Analysis Area

3.12.4 Affected Environment

The Affected Environment section is organized into seven subsections. The first five subsections (3.12.4.1, Fish Species through 3.12.4.5, Westslope Cutthroat Trout) describe the fish species in the analysis area, focusing primarily on the four salmonid species to be analyzed in detail. These narratives are followed by subsection 3.12.4.6, Fish Density, which describes areal and linear fish density estimates. The last subsection (3.12.4.7, Watershed Condition Indicators) describes the baseline aquatic habitat conditions using Watershed Condition Indicators (Forest Service 2003, 2010a) as determined by both field data and habitat modeling analyses.

3.12.4.1 Fish Species

The four federally-listed or Forest Service sensitive fish species (i.e., special status fish species) known to be present in the analysis area are Chinook salmon, steelhead trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), and westslope cutthroat trout (*Oncorhynchus clarkii lewisi*). Chinook salmon, steelhead, and bull trout are all federally listed as threatened under the ESA, and westslope cutthroat trout is a Forest Service sensitive specie. As stated previously, bull trout also are a Forest Service Management Indicator Species on the PNF and the BNF. These four salmonid species are the focus of the fish analysis and, therefore; were used to focus the description of the Affected Environment.

Other native fish species found within the analysis area are mottled sculpin (*Cottus bairdii*), longnose dace (*Rhinichthys cataractae*), speckled dace (*Rhinichthys osculus*), redside shiner (*Richardsonius balteatus*), mountain whitefish *(Prosopium williamsoni),* Pacific lamprey (*Entosphenus tridentatus*), and mountain sucker (*Catostomus platyrhynchus*).

Appendix J-1 (Supplemental Information) includes a list of every fish species documented in the analysis area, including non-native fish introduced to the area. Introduced non-native fish, except for the brook trout (*Salvelinus fontinalis*) and California golden trout (*Oncorhynchus mykiss aguabonita*), a subspecies of rainbow trout, are not addressed in this EIS. Native special status salmonids are among the most sensitive to changes in environmental variables such as, water temperature, sediment, or contaminants. Accordingly, the native salmonids are a sensitive surrogate for non-native species of management interest.

3.12.4.2 Chinook Salmon

3.12.4.2.1 STATUS

The Snake River spring/summer-run Chinook Salmon Evolutionary Significant Unit was listed as threatened under the ESA in 1992 (57 Federal Register 14653). Most Chinook salmon in the analysis area are considered “summer-run” fish[3] (NMFS 2017). These fish are found in the

3 Chinook salmon that arrive on their spawning grounds and spawn during the summer period, typically June to August.

South Fork Salmon River subbasin and the EFSFSR drainage upstream to the Yellow Pine pit lake within the proposed mine site (**Figure 3.12-5**). See **Table 3.12-17** in Section 3.12.4.6.2.1, Fish Density – Stream Estimates, for an estimate of the relative abundance of Chinook salmon. An artificial cascade with a slope of 22 percent located upstream of Yellow Pine pit lake is a barrier to further upstream natural migration for adult Chinook salmon; however, juvenile fish can move downstream through the cascade because adult Chinook salmon have been reintroduced upstream of the Yellow Pine pit lake by the IDFG. Spawning-ready adult Chinook salmon are periodically translocated from the South Fork Salmon River to upstream of the barrier with support from the Nez Perce Tribe (see Section 3.12.4.2.4.1, Surplus Supplementation).

Historically, the Snake River was considered the Columbia River Basin's most productive drainage for salmon, supporting more than 40 percent of all Snake River spring/summer Chinook salmon (Fulton 1968; NMFS 1995 *in* NMFS 2017). Strong runs of Chinook salmon returned each year to spawn and rear in the mainstem and tributary reaches of the Snake River extending upstream to Shoshone Falls near Twin Falls, Idaho. The fish also ranged into most Snake River tributaries stretching across portions of the states of Oregon, Washington, Idaho, and Nevada.

Currently, the stock has been severely depleted from a variety of activities, including: hydropower systems, hatcheries, harvest, fish passage, and pathogens/predation/competition. Chinook salmon remain at risk of becoming endangered within 100 years (NMFS 2017). Multiple threats across their life cycle contribute to their current status and need to be addressed to ensure that Snake River spring/summer Chinook salmon populations can be self-sustaining in the wild over the long-term (NMFS 2017).

The proposed status for the EFSFSR population is considered "maintained," indicating there is a moderate (25 percent or less) risk of extinction over 100 years (NMFS 2017).

3.12.4.2.2 CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

Critical habitat for Chinook salmon was originally designated in 1993 (58 Federal Register 68543) and re-designated in 1999 (64 Federal Register 57399). As defined, designated critical habitat includes all "river reaches presently or historically accessible (except reaches above impassible natural barriers (including Napias Creek Falls [Napias Creek tributary to the Salmon River]) and Dworshak and Hells Canyon Dams)" (64 Federal Register 57403). Thus, designated critical habitat includes all presently and historically accessible rivers and streams within the analysis area, except for the Payette River drainage. The Payette River drainage historically supported anadromous fish, but is excluded by rule from being designated as critical habitat because it is now upstream of the Hells Canyon Dam Complex.

Given the very broad definition of critical habitat for Chinook salmon, a more refined description of the affected environment for the proposed SGP was needed. Two different sets of information were used to address this need. First, data on the historical and current distribution of Chinook salmon occurrences (fish observations and spawning redd counts) were compiled to determine the actual locations occupied by fish (Isaak et al. 2017). The premise was that such locations were empirical evidence of Chinook salmon critical habitat. **Figure 3.12-5** displays the known occurrence/spawning locations for Chinook salmon in that portion of the analysis area where critical habitat has been designated, (i.e., the South Fork Salmon River subbasin).

Second, available Geographic Information System data was used to conduct critical habitat analysis for Chinook salmon within the proposed mine site (**Appendix J-6**) focused on Chinook salmon upstream migration capabilities within the EFSFSR. This approach identified maximum gradient (% slope) for Chinook salmon upstream migration based on an existing occurrence data set (Isaak et al. 2017), and then used that maximum gradient as the cut-off point to modeled critical habitat, (i.e., areas with steeper slopes were not identified as modeled critical habitat) (**Appendix J-6**). **Figure 3.12-6** illustrates the extent of modeled critical habitat for Chinook salmon at the proposed mine site, which includes much of the stream habitat upstream of the Yellow Pine pit lake cascade barrier. Currently, there is an estimated 26.5 kilometers (km) of modeled Chinook salmon critical habitat upstream of the Yellow Pine pit lake barrier.

The EFH important for anadromous salmon for freshwater spawning and rearing include: water quality, water quantity, substrate, floodplain connectivity, forage, natural cover, and free of artificial obstructions for freshwater migration (NMFS 2017). EFH has been designated for Chinook salmon within all streams and other waterbodies occupied or historically accessible to Chinook salmon (67 Federal Register 2343, 2002).

3.12.4.2.3 PHYSICAL AND BIOLOGICAL FEATURES AND RECOVERY PLAN

NMFS (2017) designated the following sites and essential physical and biological features as primary constituent elements for anadromous salmon and steelhead in freshwater:

- Freshwater spawning (water quality, water quantity, and substrate);
- Freshwater rearing (water quantity and floodplain connectivity, water quality and forage, and natural cover);
- Freshwater migration (free of artificial obstruction, water quality and quantity, and natural cover).

These physical and biological features have been designated because of their potential to develop or improve and eventually provide the needed ecological functions to support species recovery (NMFS 2017).

The 2017 NMFS Recovery Plan identified recovery strategies for Snake River spring/summer Chinook salmon for the Lower EFSFSR and Upper EFSFSR watersheds (proposed mine site location) including:

- Maintain current wilderness protection and protect pristine tributary habitat;
- Provide/improve passage to and from areas with high intrinsic potential through barrier removal;
- Reduce and prevent sediment delivery to streams by improving road systems and riparian communities, and rehabilitating abandoned mine sites; and
- Manage risks from tributary fisheries according to an abundance-based schedule.

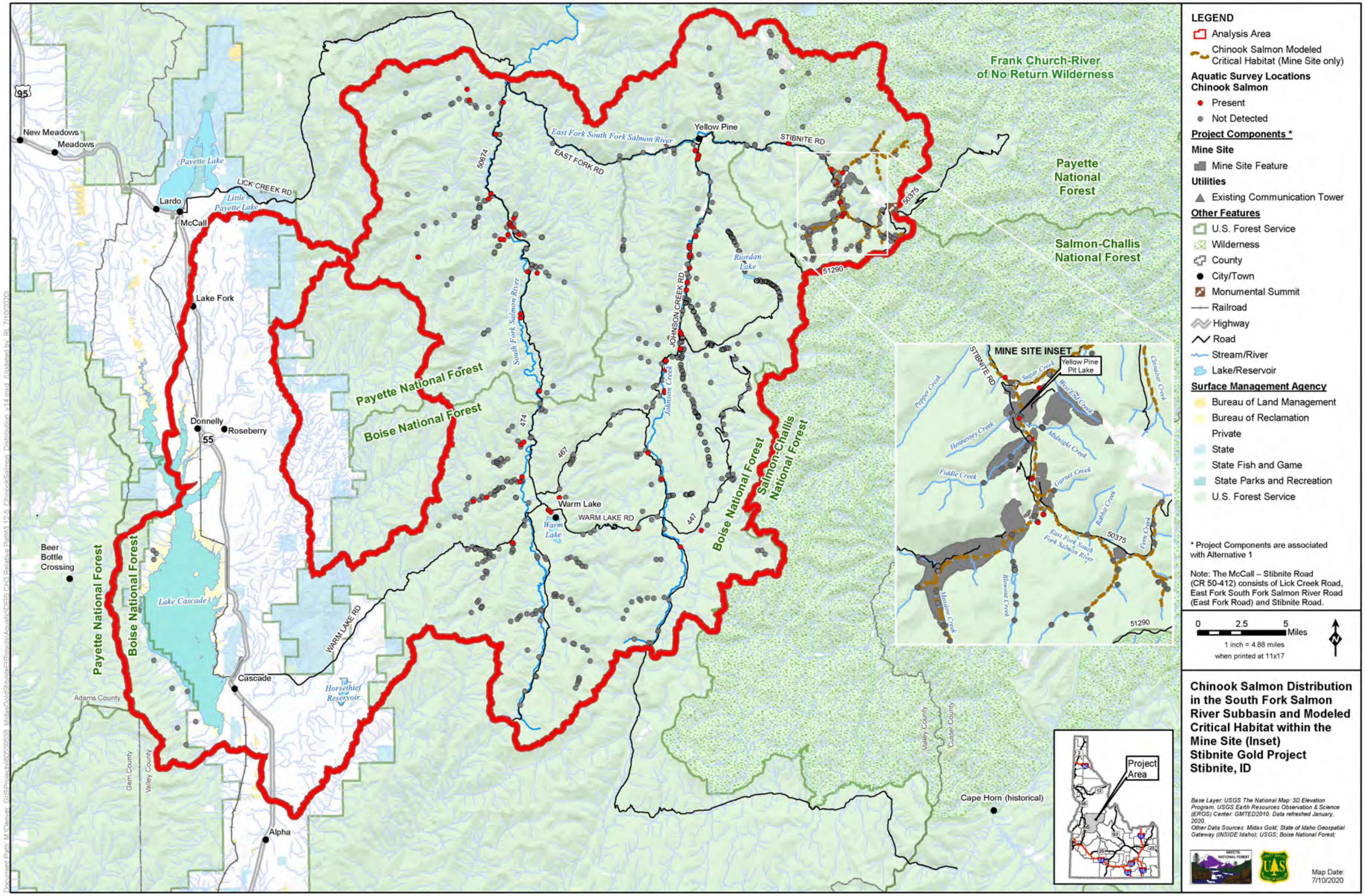

Figure Source: AECOM 2020

Figure 3.12-5 Chinook Salmon Distribution in the South Fork Salmon River Subbasin and Modeled Critical Habitat within the Mine Site (Inset)

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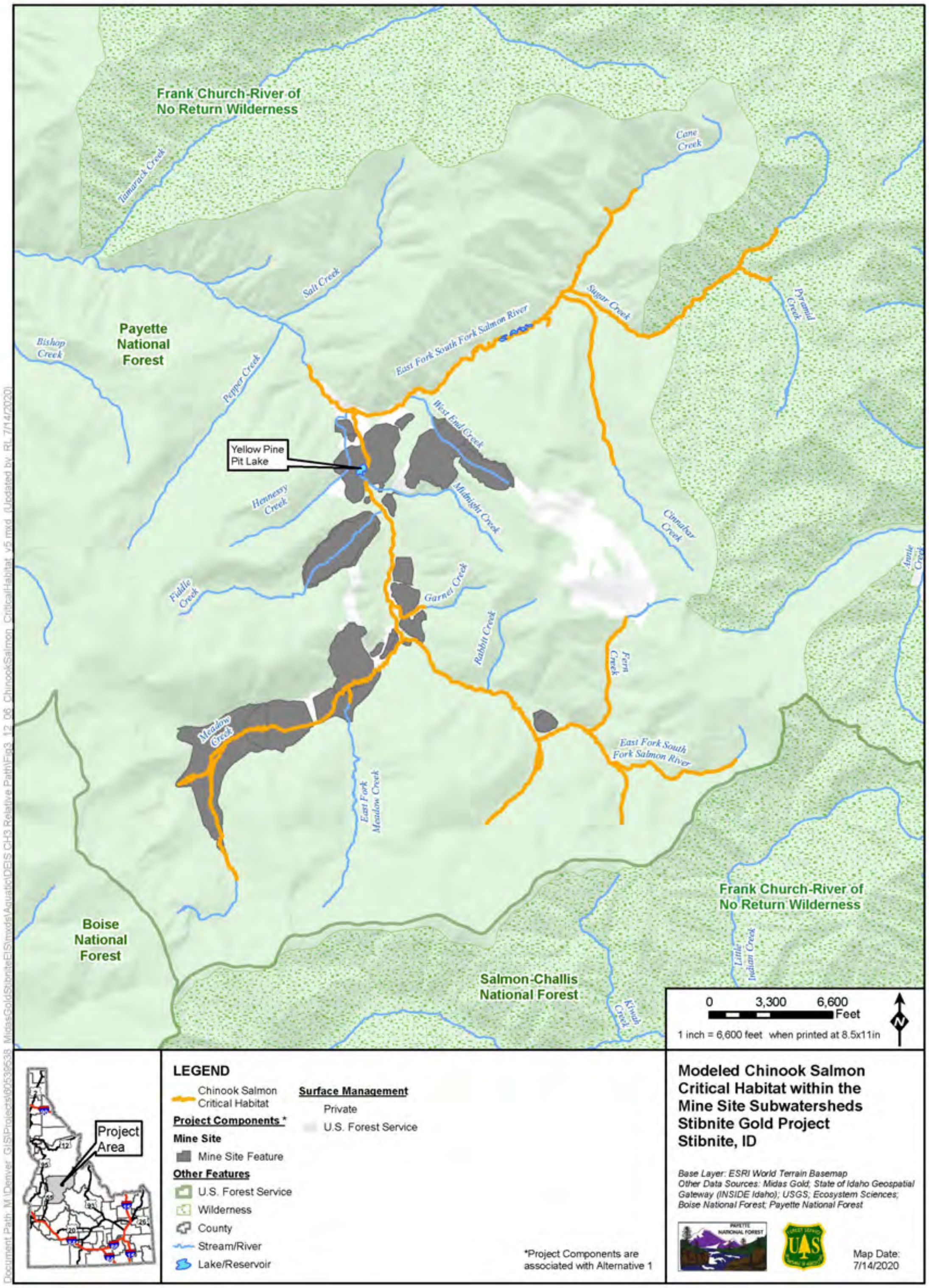

Figure Source: AECOM 2020

Figure 3.12-6 Modeled Chinook Salmon Critical Habitat within the Mine Site Subwatersheds

3.12.4.2.3.1 Chinook Salmon Temperature Requirements and Baseline

Chinook salmon have different temperature requirements or limitations for their various life stages. Exceeding thresholds could impact various life-stages and could cause fish to avoid areas or even mortality. The periodicity (i.e., recurring intervals) of each life stage and the accepted stream temperature threshold ranges for various temperature considerations for each species were compiled from regulatory standards and other relevant literature into **Appendix J-2**, a condensed version of which is presented in **Table 3.12-1**, Chinook Salmon Temperature Thresholds and Baseline Conditions.

Table 3.12-1 Chinook Salmon Temperature Thresholds and Baseline Conditions

Chinook Salmon Life Stage	Range of Water Temperature Thresholds in degrees Celsius and (Season)	Baseline Maximum Temperatures (degrees Celsius)
Adult Migration	15-22 (Summer)	13.4 – 19.8
Adult Spawning	4-14 (Summer)	13.4 – 19.8
Incubation/Emergence	6-10 (Fall/Winter)	11.1 – 16.2
Juvenile Rearing	10-23 (Year-round)	11.1 – 19.8
Common Summer Habitat Use	10-17 (Summer)	13.4 – 19.8

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum. Baseline stream temperatures from Brown and Caldwell (2019b: Table C-19)

Using the data in **Table 3.12-1,** stream temperature values, and stream segment lengths from the Stream and Pit Lake Network Temperature (SPLNT) Existing Conditions report (Brown and Caldwell 2018a), the length of proposed mine site streams within these temperature thresholds was estimated (**Table 3.12-2**). **Table 3.12-2** shows that of the entire 16.72 km of potential habitat is within the temperature thresholds for adult migration, adult spawning, juvenile rearing, and common summer habitat use; however, only 4.99 km (30 percent) is within the water temperature threshold for incubation and emergence. The length of potential habitat was based on access and Intrinsic Potential modeling, which is described further in Section 3.12.4.2.5, Intrinsic Potential Modeling – Chinook Salmon.

Table 3.12-2 Baseline Stream Length within Water Temperature Thresholds – Chinook Salmon

Chinook Salmon Life Stage	Baseline Stream Length within Water Temperature Threshold
Adult Migration - Lethal (1 week exposure)	0
Adult Spawning - Field Observed Spawning Temperature	16.72 km (100%)[1]
Incubation/Emergence - Optimal	4.99 km (30%)
Juvenile Rearing - Optimal	16.72 km (100%)
Common Summer Habitat Use - Optimal	16.72 km (100%)
Total Potential Habitat	16.72

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum

Table Notes:

1 Percent of stream length within modeled potential habitat

km = kilometers (1 km = 0.62 mile).

3.12.4.2.4 DISTRIBUTION

The EFSFSR population was historically a large population, with spawning areas throughout the EFSFSR mainstem and Johnson Creek (NMFS 2017). Anadromous fish passage in the EFSFSR upstream from the Yellow Pine pit lake was blocked in 1938 when activities for mining diverted the EFSRSR in surface ditches and later into a bypass tunnel (1943). The EFSFSR was routed back through the Yellow Pine pit after mining ceased, but the remaining 22 percent gradient cascade, just upstream of the Yellow Pine pit lake, prevents Chinook from traveling upstream. Currently, most Chinook salmon spawning in the analysis area occurs in Johnson Creek (Nez Perce Tribe 2018; Rabe et al. 2018.

Chinook salmon occurrence in the analysis area varies by life stage. Adult migration occurs between May and mid-September, with peak abundance occurring in August. Spawning occurs from mid-July to September, with peak spawning in August. Egg incubation begins in August, and emergence of larval fish occurs between January and April. Juvenile rearing occurs year-round and juvenile outmigration to the ocean occurs between mid-March to June. Life stage periodicity tables are presented in **Appendix J-2**.

3.12.4.2.4.1 Surplus Supplementation

The Nez Perce Tribe began the Johnson Creek Artificial Propagation Enhancement Project in 1998 in response to critically low numbers of returning adult Chinook salmon to Johnson Creek (Columbia River Inter-Tribal Fish Commission 2018). The program uses only natural-origin returns for broodstock, and currently has an annual target release level of 100,000 yearling smolts into Johnson Creek (NMFS 2016).

In addition, the Nez Perce Tribe and IDFG translocated (i.e., relocated) adult Chinook salmon from the South Fork Salmon River to Meadow Creek upstream of the Yellow Pine pit lake cascade barrier. These fish did not come from the Johnson Creek Artificial Propagation Enhancement Project described in the paragraph above. **Table 3.12-3** shows the number of Chinook salmon translocated upstream of the Yellow Pine pit lake cascade barrier between 2008 and 2018. Since 2008, adult spawning-ready Chinook salmon were released into Meadow Creek every year except for 2014 and 2018. Chinook salmon will continue to be translocated to lower Meadow Creek when excess adult broodstock is available. It should be noted that any juvenile Chinook salmon upstream of the Yellow Pine pit lake cascade barrier are entirely human-assisted; without fish translocation there would be no naturally occurring Chinook salmon upstream of the Yellow Pine pit lake barrier.

Table 3.12-3 Chinook Salmon Translocated Upstream of the Yellow Pine Pit Lake Cascade Barrier

Year	Total Number of Chinook Salmon Translocated
2008	142
2009	51
2010	66
2011	459
2012	294
2013	130
2014	0
2015	190
2016	536
2017	81
2018	0

Table Source: Brown and Caldwell 2019a; Forest Service 2018; MWH 2017; Nez Perce Tribe 2010, 2011; Rabe et al. 2018

3.12.4.2.4.2 Redd Surveys

A redd is defined as a depression or hollow that a salmon creates in the stream substrate (i.e., bed) to deposit eggs. The Nez Perce Tribe has conducted redd surveys for Chinook salmon upstream of the Yellow Pine pit lake in the EFSFSR, Meadow Creek, and in other South Fork Salmon River subbasin streams (e.g., Lower EFSFSR, Burntlog Creek, Johnson Creek, Sugar Creek, and Tamarack Creek) since 2008 (Nez Perce Tribe unpublished data 2018; Rabe et al. 2018). **Table 3.12-4** shows the number of redd counts in the EFSFSR and tributaries within or near the proposed mine site between 2008 and 2018.

Table 3.12-4 Chinook Salmon Redd Counts in the Upper EFSFSR and Johnson Creek Watersheds, 2008-2018 (Listed in Order from Upstream to Downstream)

Year	Meadow Creek (Mouth to Stibnite Mine Tailings)	EFSFSR (Fiddle Creek to Meadow Creek)	EFSFSR (Sugar Creek to YPP Lake)	Sugar Creek (Mouth to Cinnabar Creek)	EFSFSR (Quartz Creek to Sugar Creek)	Tamarack Creek (Lower Tamarack Creek)	EFSFSR (Mouth to Yellow Pine)	Johnson Creek (Mouth to Upper Johnson Creek)	Burntlog Creek (Mouth to East Fork Burntlog Creek)
2008	0	0	0	3	2	0	0	193	30
2009	41	10	10	40	46	0	2	235	14
2010	74	8[1]	3	43	3	3	0	344	51
2011	89	13[1]	0	10	73	0	3	193	41
2012	50	7	10	17	47	0	0	234	63
2013	40	1	3	11	46	0	0	200	34
2014	0	0	7	17	42	0	2	376	41
2015	64	3	3	5	43	0	0	257	19
2016	128	7	18	13	55	0	0	253	28
2017	24	0	3	2	16	0	0	0	0
2018	0	0	0	11	18	0	0	0	0

Table Source: Nez Perce Tribe 2018 unpublished data; Rabe et al. 2018

Table Notes:

1 Two redds were found just upstream of the EFSFSR confluence with Meadow Creek.

Number of surveys only includes surveys when redds were found. Redd counts indicate total number of redds observed for each survey year. Although each redd was associated with a unique geographic location, some redds may have been double counted when multiple surveys were performed for a given year.

Upstream of the Yellow Pine pit lake, the number of Chinook salmon redds in Meadow Creek documented over the past 11 years has fluctuated from 0 (2008, 2014, and 2018) to 128 (2016), with an average count of approximately 46 redds per year. During years when adults were translocated into Meadow Creek, redd counts varied from 24 (2017) to 128 (2016). In general, lower numbers of Chinook salmon redds were found in the EFSFSR, likely because Chinook salmon are translocated to Meadow Creek and tend to spawn in close proximity to their introduction sites, and because there is generally poorer habitat quality in the EFSFSR as compared to Meadow Creek (Rio ASE 2019a). Chinook salmon redds documented in the EFSFSR (between the Yellow Pine pit lake and Meadow Creek) have ranged from 1 (2013) to 13 (2011), with an average of 5 redds per year over 11 years. The number of Chinook salmon translocated and the number of redds observed demonstrate a clear, positive relationship. As the number of adults translocated increased so did the number of redds.

Johnson Creek, a tributary of the EFSFSR downstream of the proposed mine site, had the highest numbers of Chinook salmon redd counts in the Upper EFSFSR watershed, ranging from 193 (2008, 2011) to 376 (2014), with an average count of 207 redds per year.

3.12.4.2.5 INTRINSIC POTENTIAL MODELING

To assist with describing the existing conditions and predicted potential changes in Chinook salmon and steelhead habitat at the proposed mine site, a site-specific Intrinsic Potential (IP) model was developed to derive a predictive metric for streams in the proposed mine site that could potentially support spawning and early-rearing habitat for the Chinook salmon and steelhead. In general, the Intrinsic Potential is the underlying capacity (i.e., potential) of a stream to provide habitat. The IP model was used to estimate the potential for spawning and rearing habitat in the Sugar Creek subwatershed and the Headwaters of the EFSFSR subwatershed (**Figure 3.12-7**). These two subwatersheds encompass the proposed mine site where mining-related activities are proposed. In addition, a portion of the EFSFSR downstream of the confluence with Sugar Creek was included in the model, refered to as the “additional segment”. The application of an IP approach provides a subwatershed-specific analysis of Chinook and steelhead habitat conditions that may be used to compare existing conditions to interim and post closure conditions in the impact analysis (Section 4.12, Fish Resources and Fish Habitat).

The output of the IP model is a classification for each subwatershed and the additional segment (measured as linear distance) that varies from “negligible” (i.e., minimal IP to support habitat) to “high” (i.e., likely to provide habitat) with low and medium classifications in between. The following is a summary of the existing conditions and Chinook Salmon and Steelhead IP modeling. See Intrinsic Potential Model Chinook Salmon and Steelhead Technical Memorandum (**Appendix J-4**) for a detailed description and discussion of the model and results.

3.12.4.2.5.1 Methods

The methodology followed the IP approach developed by Cooney and Holzer (2006) for the Interior Columbia Basin, but was refined for the proposed mine site using site-specific data (i.e., Light Detection and Ranging topography and field data). The IP modeling used key landscape characteristics of gradient, channel characteristics, and valley confinement (i.e., valley bottom) at a local SGP-specific scale (i.e., the proposed mine site) to estimate the linear potential of each of the two subwatersheds and additional segment of EFSFSR to support spawning and early-rearing habitat for Chinook salmon and steelhead. Field data and modeled parameters were used as inputs to the IP model. Other important information for the model included the following:

- The IP model extent is the proposed mine site streams within two subwatersheds (Headwaters of the EFSFSR and Sugar Creek) and the additional segment below the confluence of EFSFSR and Sugar Creek(**Figure 3-12.7**);
- Field-collected data were used as inputs to the model where available, primarily bankfull and wetted widths;
- Wetted width is a key parameter for Chinook salmon. PIBO data, and Rio ASE field data (Rio ASE 2019a) were used;
- Modeling was performed at a 30-meter linear reach-scale and the results have been summarized by subwatershed and the additional segment; and
- The IP model analysis identified Chinook salmon spawning and early-rearing habitat potential for waters upstream of the Yellow Pine pit cascade barrier; however, this area is not currently accessible by natural upstream migration of adult fish.

Table 3.12-5 shows the input Chinook and steelhead IP model parameters and their source(s).

Table 3.12-5 Data and Parameters Used to Develop the IP Model for Chinook salmon and Steelhead

Parameter	Chinook	Steelhead	Source
Wetted Width (meters [m])	≥3.6m	N/A	PIBO and Rio ASE field data Rio ASE wetted width (WW) calculation: WW = bankfull (BF) * 0.799
Bankfull (m)	N/A	≥3.8m	PIBO and Rio ASE field data Rio ASE BF calculation based on drainage area (DA) and then converted to meters: BF (ft)[1] = 6.868 * $DA^{0.407}$
Gradient (% slope)	<7%	<7%	Derived in ESRI ArcGIS based on Lidar data and streamline segment
Valley Bottom Width (m)	Stream Reach Dependent	Stream Reach Dependent	Derived in ESRI ArcGIS using the Valley Bottom Extraction Tool (VBET)
Valley Width Ratio (VWR)	Valley Bottom Width (VBW) / Bankfull (BF)	VBW / BF	Derived in ESRI ArcGIS by dividing the Valley Bottom Width by its corresponding segments bankfull width (VWR = VBW/BF)

Table Source: **Appendix J-4**

Table Notes:

1 The equation used to calculate the wetted width uses feet (ft), the total is then the BF is converted to meters (m)
BF = bankfull; DA = drainage area; Lidar = light detection and ranging; m = meters (1 m = 3.28 ft); N/A = not applicable; PIBO = PACFISH/INFISH Biological Opinion; WW = wetted width; VBET = Valley Bottom Extraction Tool; VWR = valley width ratio; VBW = valley bottom width

Additional details regarding the model methods and approach are available in **Appendix J-4**.

3.12.4.2.5.2 Results

The IP model was used to evaluate approximately 113,001 meters of stream/river in the two subwatersheds and additional segment previously described. **Table 3.12-6** and **Figure 3.12-7** present the results for the IP modeling for Chinook salmon.

The results show the IP modeling area streams provide approximately 18,610 meters of potential spawning and early-rearing habitat for Chinook salmon. Most (83.5 percent) of the length of stream modeled had no IP habitat for Chinook salmon (**Table 3.12-6**). Overall, 16.5 percent of the IP-modeled area streams could provide habitat for Chinook salmon, with the highest amount, approximately 8,744 meters rated as low potential, followed by 7,287 meters of medium potential, 1,740 meters rated as negligible potential, and 839 meters rated as high potential.

In addition, there is a small area (721 meters – 1 percent) of high-rated Chinook salmon IP habitat located in the Meadow Creek drainage (Headwaters EFSFSR subwatershed), downstream of the existing Spent Ore Disposal Area (SODA) (**Figure 3.12-7**) and where the surplus supplementation sites are located.

The results show there is approximately 10,241 meters of IP habitat for Chinook salmon above the Yellow Pine pit barrier. However, as stated above, this 10,241 meters of IP is not currently accessible to the natural migration of adult Chinook salmon given the Yellow Pine pit cascade barrier (**Table 3.12-6**).

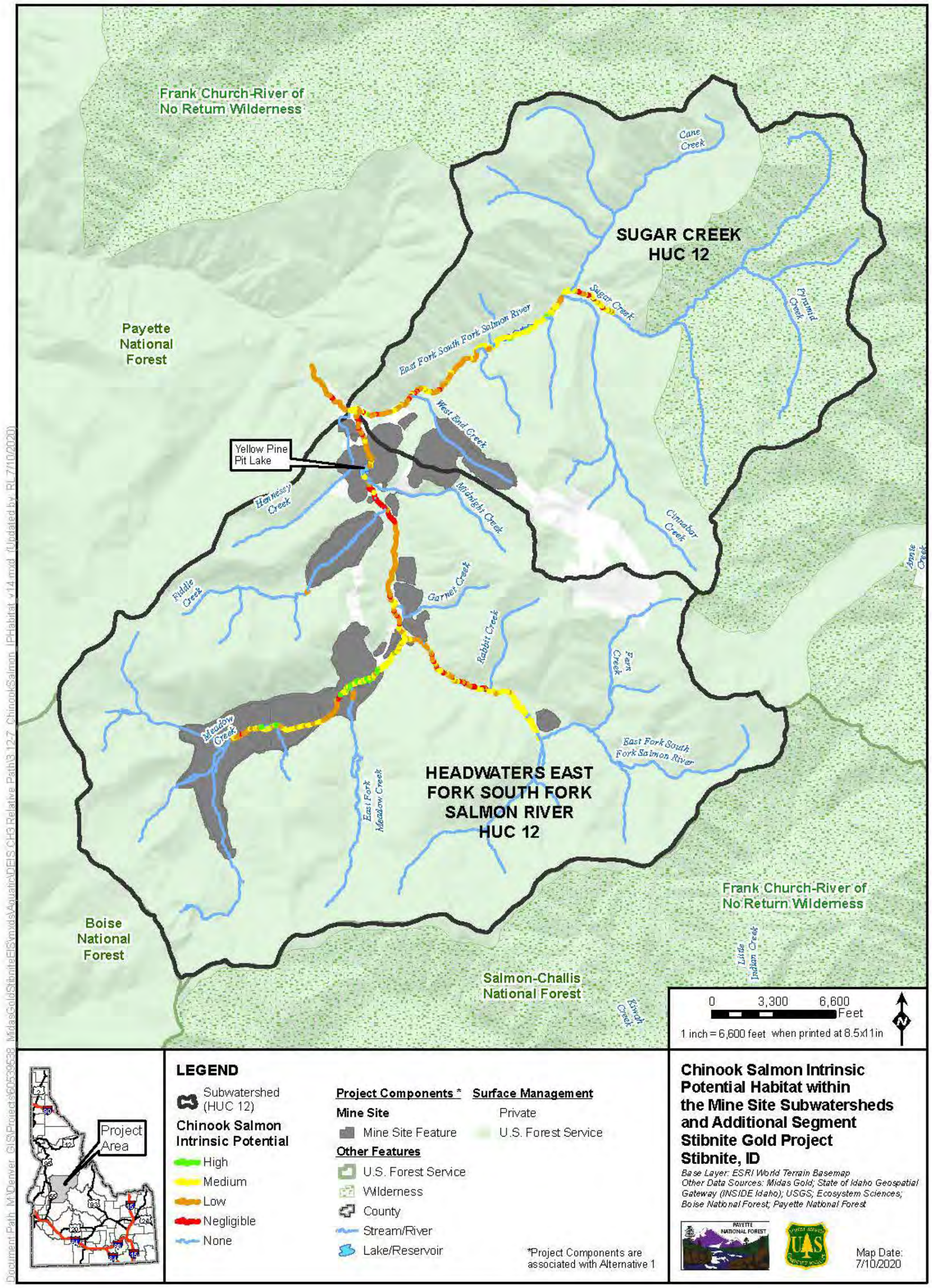

Figure Source: AECOM 2020

Figure 3.12-7 Chinook Salmon Intrinsic Potential Habitat within the Mine Site Subwatersheds and Additional Segment

Table 3.12-6 Chinook Salmon Intrinsic Potential Existing Condition Modeling Results

Headwaters EFSFSR Subwatershed			Sugar Creek Subwatershed			Downstream of Confluence of EFSFSR and Sugar Creek			Total IP Habitat in Analysis Area (meters)
Chinook Salmon IP[1]	Length (meters)	Headwaters EFSFSR (%)	Chinook Salmon IP[1]	Length (meters)	Sugar Creek (%)	Chinook Salmon IP[1]	Length (meters)	Downstream of EFSFSR/Sugar Creek (%)	
High	721.4 (721.4)[2]	1.1	**High**	117.4	0.3	**High**	0	0	**838.8**
Medium	4,299.1 (4,001.3)[2]	6.6	**Medium**	2,958.2	6.3	**Medium**	30.0	2.7	**7,287.3**
Low	5,098.7 (4,378.6)[2]	7.8	**Low**	2,625.6	5.6	**Low**	1,020.1	91.9	**8,744.4**
Negligible	1,290 (1,140.0)[2]	1.9	**Negligible**	389.7	0.8	**Negligible**	60	5.4	**1,739.7**
Total IP Habitat	**11,409.3 (10,241.3)[2]**	**17.5**	**Total IP Habitat**	**6,090.9**	**13.1**	**Total IP Habitat**	**1,110.1**	**100.0**	**18,610.2 (16.5%)[3]**
Total Length Evaluated	**65,250.3**	**100.0**	**Total Length Evaluated**	**46,640.9**	**100.0**	**Total Length Evaluated**	**1,110.1**	**100.0**	**113,001.3**

Table Source: **Appendices J-3** and **J-4**.

Table Notes:

1 Results are presented in the table as the length (meters) of stream with usable IP. For Chinook salmon the IP is rated as high, medium, low, and negligible. "Useable" habitat is defined as all of these classes combined (usable = high + medium + low + negligible). "None" indicates that there is no intrinsic potential to provide habitat for the species and is not shown in this table.

2 Meters provided in () are length of IP habitat above (i.e., upstream) of the Yellow Pine pit lake cascade barrier (1 m = 3.28 ft)

3 Total percent of IP habitat within the total length of streams evaluated

3.12.4.3 Steelhead Trout

3.12.4.3.1 STATUS

The Snake River Basin Steelhead Trout Distinct Population Segment (DPS) is found in the EFSFSR drainage and its tributaries downstream of the Yellow Pine pit lake. Steelhead were initially listed as federally threatened under ESA in August 1997 (62 Federal Register 43937) with the geographic listing area including all natural-origin populations of steelhead in the Snake River Basin. In 2006, Snake River steelhead were subsequently reclassified as a threatened DPS (71 Federal Register 834).

The Interior Columbia Technical Recovery Team (ICTRT) identified five extant major population groups (MPGs) in the Snake River Basin steelhead DPS, which includes the Salmon River Steelhead MPG (ICTRT 2008 *in* NMFS 2017). The Salmon River Steelhead MPG consists of 12 demographically different steelhead populations all of which are presently considered non-viable (NMFS 2017). The Salmon River Steelhead MPG includes the South Fork Salmon River population (NMFS 2017), which is within the analysis area. The South Fork Salmon River population includes fish in the South Fork Salmon River and all of its tributaries, except the Secesh River. This population is found within three major tributaries in the analysis area: the EFSFSR, Johnson Creek, and the Upper South Fork Salmon River. The South Fork Salmon River steelhead population is considered "maintained," with a tentative moderate abundance/productivity risk and low distribution and diversity risk (ICTRT 2008). This population is targeted to achieve a proposed status of "viable," which requires a minimum of low abundance/productivity risk. The overall distribution and diversity rating for this species is currently low enough for the population to reach its proposed status (NMFS 2017). See **Table 3.12-17** in Section 3.12.4.6.2.1, Fish Density – Stream Estimates, for an estimate of the relative abundance of steelhead trout.

Habitat limiting factors for the South Fork Salmon River steelhead population are linked to human disturbances, such as mining and road construction. Human disturbances and heavy precipitation make the subbasin susceptible to large sediment-producing events that degrade habitat quality for steelhead. Roads located near streams encroach on riparian habitat, limit potential sources of large woody debris, and create passage barriers at road-stream crossings. Priorities for addressing limiting factors in the South Fork Salmon River steelhead population include mitigation and elimination of sediment inputs from human-caused disturbances and elimination of artificial fish passage barriers.

3.12.4.3.2 CRITICAL HABITAT

The final rule designating critical habitat was implemented in January 2006 (70 Federal Register 52630). Critical habitat for Snake River Basin steelhead is designated throughout the EFSFSR drainage to approximately 0.4 km upstream of the confluence with Sugar Creek, including Sugar Creek, and two creeks in the Johnson Creek watershed, Burntlog Creek, and Riordan Creek (**Figure 3.12-8**). Critical habitat for steelhead is not designated upstream of the Yellow Pine pit lake; however, it is assumed that steelhead were found in the headwaters of the EFSFSR prior to 1938. Similar to Chinook salmon, the Yellow Pine pit lake cascade barrier precludes steelhead from migrating upstream of the Yellow Pine pit lake (**Figure 3.12-8**). **Figure 3.12-8** displays the distribution of steelhead and designated critical habitat for steelhead in the analysis area.

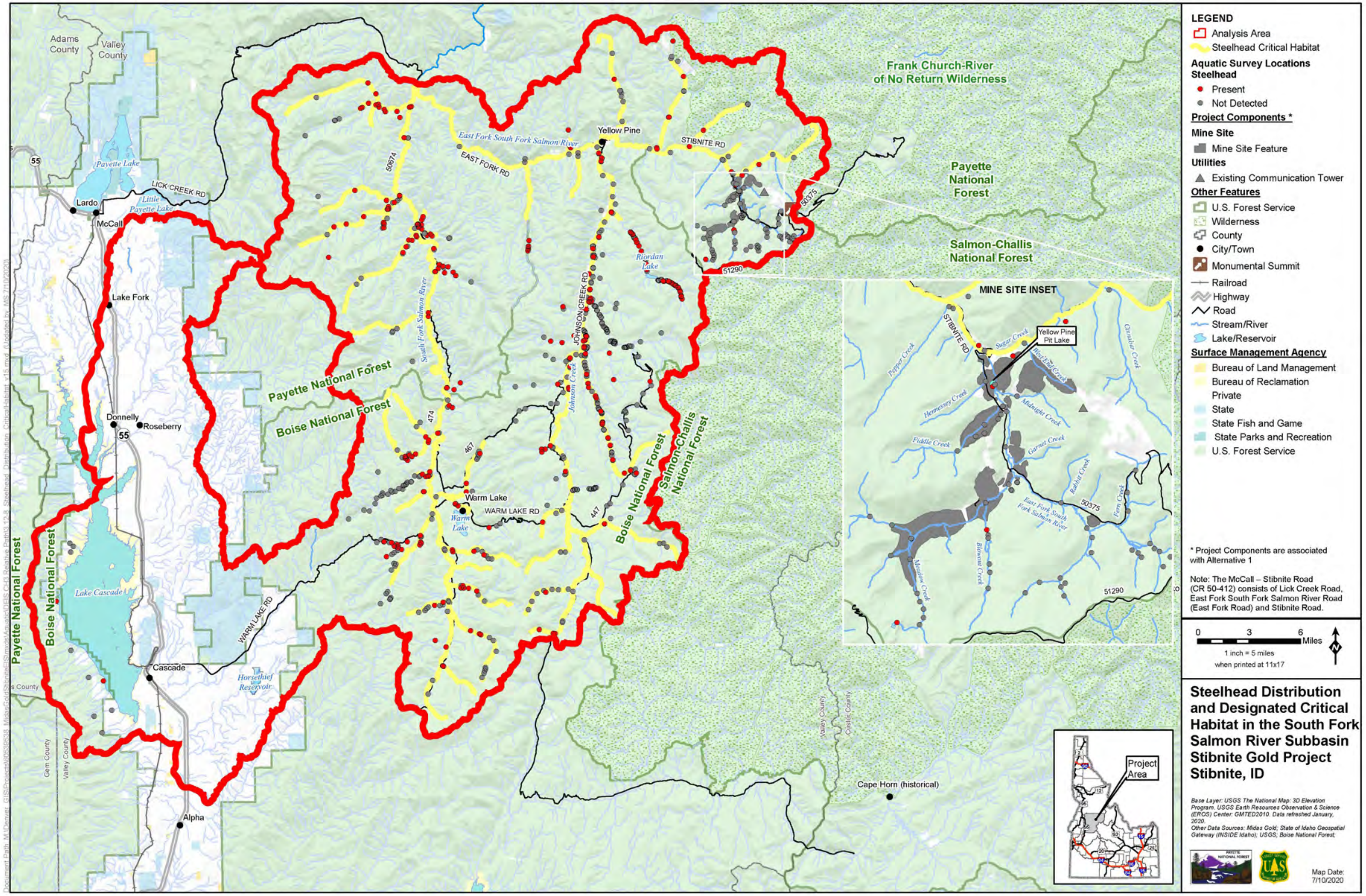

Figure Source: AECOM 2020

Figure 3.12-8 Steelhead Distribution and Designated Critical Habitat in the South Fork Salmon River Subbasin

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3.12.4.3.3 PHYSICAL AND BIOLOGICAL FEATURES AND RECOVERY PLAN

NMFS (2017) designated the following sites and essential physical and biological features as primary constituent elements for anadromous salmon and steelhead in freshwater:

- Freshwater spawning (water quality, water quantity, and substrate);
- Freshwater rearing (water quantity and floodplain connectivity, water quality and forage, and natural cover);
- Freshwater migration (free of artificial obstruction, water quality and quantity, and natural cover).

These physical and biological features have been designated because of their potential to develop or improve and eventually provide the needed ecological functions to support species recovery (NMFS 2017).

The 2017 NMFS Recovery Plan included recovery strategies for Salmon River steelhead. Priorities for steelhead populations specific to the EFSFSR watershed include: (1) collect and analyze population-specific data to accurately determine population status; (2) maintain wilderness protection and protect pristine tributary habitat; (3) eliminate artificial passage barriers and improve connectivity to historical habitat; (4) reduce and prevent sediment delivery to streams by rehabilitating roads and mining sites; and (5) manage risks from tributary fisheries through updated Fisheries Management Evaluation Plans and Tribal Resource Management Plans according to an abundance-based schedule.

3.12.4.3.3.1 Steelhead Temperature - Requirements and Baseline

Steelhead trout have different thermal requirements or limitations for their various life stages. Exceeding thresholds could impact various life-stages and could cause fish to avoid areas or even mortality. The periodicity of each life stage and the accepted stream temperature threshold ranges for various temperature considerations for each species were compiled from regulatory standards and other relevant literature into **Appendix J-2,** a condensed version of which is provided in **Table 3.12-7**.

Table 3.12-7 Steelhead Trout Temperature Thresholds

Steelhead Trout Life Stage	Range of Water Temperature Thresholds in degrees Celsius and (season)	Baseline Maximum Temperature (degrees Celsius)
Adult Migration	15-22 (Summer)	13.4 – 19.8
Adult Spawning	4-14 (Spring)	13.4 – 19.8
Incubation/Emergence	6-10 (Spring/Summer)	11.1 – 16.2
Juvenile Rearing	10-20 (Year-round)	11.1 – 19.8
Common Summer Habitat Use	10-17 (Summer)	13.4 – 19.8

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum. Baseline temperatures from Brown and Caldwell (2019b: Table C-19).

Using the data in **Table 3.12-7,** stream temperature values, and stream segment lengths from the SPLNT Existing Conditions report (Brown and Caldwell 2018a), the length of mine site streams within these thresholds was estimated **(Table 3.12-8)**. Overall, findings show there is 2.13 km of available habitat (**Appendix J-2**), all of it is within the thresholds for adult migration, adult spawning, juvenile rearing, and common summer habitat use; however, there is no available habitat (0 km) within the water temperature threshold for incubation/emergence. The length of potential habitat was based on access and Intrinsic Potential modeling, which is described further in Section 3.12.4.3.5, Intrinsic Potential Modeling.

Table 3.12-8 Baseline Stream Length within Water Temperature Threshold Ranges – Steelhead Trout

Steelhead Trout Life Stage	Baseline Stream Length within Water Temperature Threshold (km)
Juvenile Rearing - Optimal	2.13
Common Summer Habitat Use - Optimal	2.13
Total Available Habitat	2.13

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum

Table Notes:

km = kilometers (1 km = 0.62 mi).

3.12.4.3.4 DISTRIBUTION

Figure 3.12-8 displays the distribution of steelhead in the analysis area. Steelhead trout occur throughout the EFSFSR, up to Yellow Pine pit where a steep high gradient riffle/cascade caused by past mining activities is thought to preclude upstream migration. Steelhead can maneuver through higher gradients than Chinook salmon; however, genetic surveys (eDNA sampling) suggest such migration does not occur above the Yellow Pine pit lake. Genetic surveys (eDNA sampling) can give positive results for steelhead trout when the fish is actually another type of trout (e.g., cutthroat, rainbow, or golden trout) because they are trout species and they can hybridize. Hybridization between cutthroat trout and rainbow trout (*Oncorhynchus mykiss* spp.), in waters where they co-occur, is common. Of the 153 individual fish tissue genetic samples collected in 2015 in Meadow Creek and the EFSFSR near Meadow Creek (upstream of the Yellow Pine pit), 146 tissue samples were pure westslope cutthroat trout (95.4 percent), and seven tissue samples were westslope cutthroat trout/rainbow trout hybrids (MWH 2017). An additional 33 eDNA fish tissue samples from various locations upstream of the Yellow Pine pit lake (between 2014–2016) were collected and two fish tested positive for rainbow trout DNA (0.6 percent), one in Meadow Creek Lake and one in the East Fork Meadow Creek (Blowout Creek). It is likely that the rainbow trout genetics detected from these locations are, in fact, California golden trout (*Oncorhynchus mykiss aguabonita*). Golden trout are a recognized subspecies of rainbow trout and are not native to the region.

Golden trout are still stocked by the IDFG in Meadow Creek Lake (IDFG 2019). The DNA of the golden trout subspecies of rainbow trout is difficult to distinguish from other rainbow trout subspecies (e.g., steelhead trout). Carim et al. (2017) studied fish presence and distribution in Upper EFSFSR and Meadow Creek Lake, partially to determine whether eDNA-based detections of rainbow trout could be explained by the presence of the California golden trout subspecies originating from stocked fish in Meadow Creek Lake. This study concluded that the eDNA-based detections of rainbow trout could be explained by the presence of California golden trout originating from the stocked fish in Meadow Creek Lake.

Although spawning is not well documented, redds and adults were identified in 2004 downstream from the village of Yellow Pine. Most of the spawning sites were in small pockets of suitable substrate, rather than in well-developed spawning riffles (Nelson 2009). Steelhead also spawn upstream from the village of Yellow Pine (**Figure 3.12-8**), but spring redd surveys are both difficult to implement and uncommon due to residual snow and high stream flows.

Little is known about steelhead use of the Yellow Pine pit lake, but it is likely the distribution is limited. In 2018 and 2019, Brown and Caldwell (2019a, 2020a) reported only 5 and 9 steelhead in Yellow Pine pit lake, respectively.Unlike Chinook salmon (via trap and haul) and bull trout, steelhead have not been historically found upstream of the Yellow Pine pit lake. However, it is possible some migrating steelhead adults make use of the Yellow Pine pit lake as a holding area before migrating downstream to more suitable spawning grounds. Similarly, the lake may be used for rearing by some juvenile steelhead that have dispersed upstream from downstream spawning areas (Brown and Caldwell 2019a).

Steelhead occurrence in the analysis area varies by life stage and season. Adult migration occurs between mid-March and June with the peak from April to mid-May. Spawning occurs from April to mid-June, with the peak from mid-April to June 1. Incubation/emergence occurs between mid-April and mid-August. Juvenile rearing occurs year-round, with out-migration also occurring year-round with a peak during July and August. Life stage periodicity tables are presented in **Appendix J-2**.

3.12.4.3.5 INTRINSIC POTENTIAL MODELING

The following is a summary of the results for steelhead IP modeling from the *Chinook Salmon and Steelhead IP Modeling Technical Memoranda* provided in **Appendix J-4.** For additional information and description of the modeling approach see Section 3.12.4.2.5.1, Intrinsic Potential Modeling Methods for Chinook Salmon and **Table 3.12-5**, Data and Parameters Used to Develop the IP Model for Chinook Salmon and Steelhead.

3.12.4.3.5.1 Results

The IP model classified the potential for spawning and rearing habitat in two subwatersheds: Sugar Creek subwatershed and the Headwaters of the EFSFSR subwatershed, and an additional segment below the confluence of EFSFSR and Sugar Creek (**Figure 3.12-9**). This area encompases the proposed mine site where mining activities are proposed. Approximately 113,001 meters were evaluated for IP for steelhead. The results show the IP modeling area has approximately 17,899 meters (15.8 percent) of potential spawning and early-rearing habitat for steelhead. **Table 3.12-9** and **Figure 3.12-9** present the results for the IP modeling.

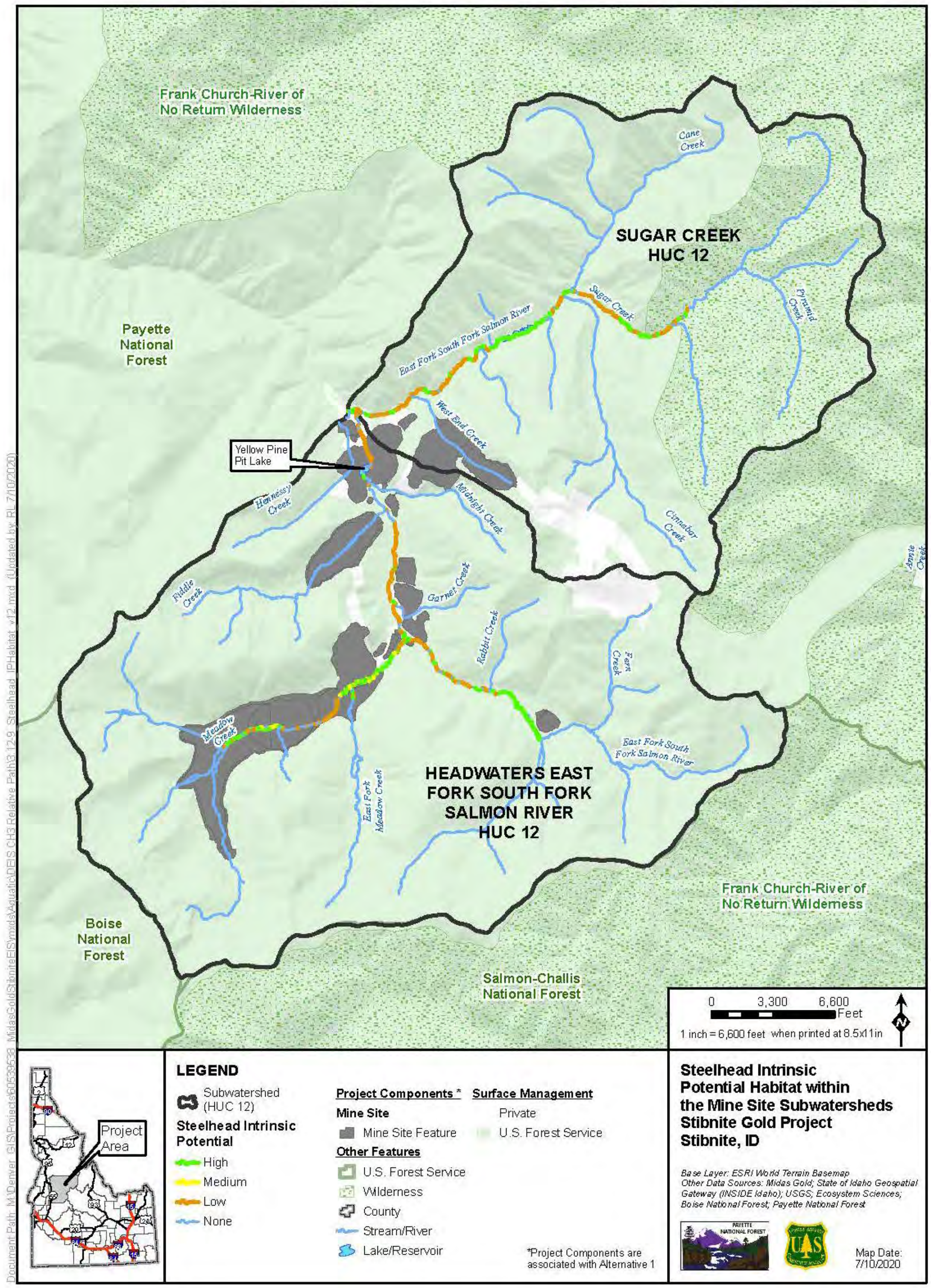

Figure Source: AECOM 2020

Figure 3.12-9 Steelhead Intrinsic Potential Habitat within the Mine Site Subwatersheds

Table 3.12-9 Steelhead Intrinsic Potential Modeling Results for Baseline Conditions

Headwaters EFSFSR Subwatershed			Sugar Creek Subwatershed			Downstream of Confluence of EFSFSR and Sugar Creek			Total IP Habitat (meters)
Steelhead IP[1]	Length (meters)	Headwaters EFSFSR (%)	Steelhead IP[1]	Length (meters)	Sugar Creek (%)	Steelhead IP[1]	Length (meters)	Downstream of EFSFSR/Sugar Creek (%)	
High	4,538.8 (4,361)[2]	7.0	**High**	3,473.8	7.5	**High**	30	2.7	**8,042.6**
Medium	601.6 (601.6)[2]	0.9	**Medium**	0	0.0	**Medium**	0	0	**601.6**
Low	4,529.3 (3,809.2)[2]	6.9	**Low**	3,704.8	7.9	**Low**	1,020.1	91.9	**9,254.2**
Total IP Habitat	**9,670 (8,772)[2]**	**14.8**	**Total IP Habitat**	**7,178.6**	**15.3**	**Total IP Habitat**	**1,050.1**	**94.6**	**17,899 (15.8%)[3]**
Total Length Evaluated	**65,250.3**	**100.0**	**Total Length Evaluated**	**46,640.9**	**100.0**	**Total Length Evaluated**	**1,110.1**	**100.0**	**113,001.3**

Table Source: **Appendices J-3** and **J-4**.

Table Notes:

1 Results are presented in the table as the length (meter of stream with IP. For steelhead the IP is rated as high, medium, and low. The “negligible” category is not used for steelhead. “Useable” habitat is defined as all of these classes combined (usable = high + medium + low). ”None” indicates that there is no intrinsic potential to provide habitat for the species and is not shown in this table.

2 Meters provided in () are length of IP habitat above (i.e., upstream) of the Yellow Pine pit lake cascade barrier (1 m = 0.62 ft)

3 Total percent of IP habitat within the total length of streams evaluated

% = percent.

Most (84 percent) of the length of stream modeled had no IP habitat for steelhead (**Table 3.12-9**). 15.8 percent of the IP modeled linear length was rated as potentially usable habitat, with the highest amount, approximately 9,254 meters, rated with low IP, followed by 8,042 meters of high-rated, and 602 meters of medium-rated potential habitat.

As shown in **Figure 3.12-9**, high-rated steelhead spawning and early-rearing habitat potentially occurs throughout the two subwatersheds and the additional portion below the confluence of EFSFSR and Sugar Creek. Portions of Sugar Creek contain high-rated IP, specifically downstream of Cinnabar Creek. Within Meadow Creek (headwaters EFSFSR watershed), high-rated steelhead IP occurs both upstream and downstream of the SODA. Additionally, the headwaters EFSFSR upstream of the Meadow Creek confluence contains high-potential steelhead spawning and early-rearing habitat. Based on the model, there is approximately 8,772 meters of IP that is not currently accessible to natural migration of steelhead beyond the Yellow Pine pit cascade barrier.

3.12.4.4 Bull Trout

3.12.4.4.1 Status

The USFWS listed the Columbia River DPS of bull trout (*Salvelinus confluentus*) as threatened in June 1998 (63 Federal Register 31647).

Bull trout are currently known to use spawning and rearing habitat in at least 28 streams within the South Fork Salmon River subbasin, including Burntlog Creek, Trapper Creek, Riordan Lake, EFSFSR, Sugar Creek, Tamarack Creek, and Profile Creek. IDFG trend data indicates that the geographic extent of bull trout is increasing (IDFG 2005). Potential threats to the population within the South Fork Salmon River subbasin include connectivity impairment, habitat degradation, and competition from invasive brook trout (USFWS 2015a). Fish sampling has not documented brook trout in any of the proposed mine site streams, but this species may occur in several streams in the vicinity of the proposed Burntlog Route (Adams et al. 2002).

3.12.4.4.2 Critical Habitat

Within the analysis area, the USFWS has designated critical habitat for bull trout in the EFSFSR, and in Burntlog, Cane, Cinnabar, Meadow, Tamarack, Trapper, Riordan, and Sugar creeks (75 Federal Register 63898). **Figure 3.12-10** shows the occurrence locations of bull trout and designated critical habitat in the analysis area.

3.12.4.4.3 Physical and Biological Features and Recovery Plan

Primary constituent elements are physical and biological features that are essential to the conservation of the species. For bull trout these include, but are not limited to: space for individual and population growth and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species (USFWS 2010).

The most recent 5-year status review for bull trout was published in April 2008 (USFWS 2008); however, a new 5-year review is currently in progress (85 Federal Register 14240; March 11, 2020). The 2008 review concluded that listing the species as "threatened" remained warranted range-wide in the coterminous United States. Based on this status review, the 2010 recovery report to Congress stated that bull trout were generally "stable" range-wide. Since the listing of bull trout, there has been very little change in the general distribution in the coterminous United States.

The 2015 Recovery Plan for the Coterminous United States Population of Bull Trout (USFWS 2015a) provided recovery unit implementation plans for specific recovery units, including the Upper Snake Recovery Unit, which includes bull trout in the analysis area. Four strategies were identified for the recovery of bull trout and include:

1) Protect, restore, and maintain suitable habitat conditions;
2) Minimize demographic threats by restoring connectivity of populations, where appropriate, to promote diverse life-history strategies and conserve genetic diversity;
3) Prevent and reduce negative effects of non-native fishes and other non-native taxa; and
4) Work with partners to conduct research and monitoring to implement and evaluate recovery activities, consistent with an adaptive-management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change.

Large areas of intact habitat exist primarily in the Salmon River drainage, which is the only drainage in the Upper Snake Recovery Unit that still flows directly into the Snake River; most other drainages no longer have direct connectivity due to irrigation diversions or instream barriers (USFWS 2015a).

Bull trout exhibit three life-history strategies in the analysis area: fluvial (i.e., stream and river dwelling, spawning in small tributaries); adfluvial (lake dwelling and river spawning); and non-migratory or resident (found in small streams and headwater tributaries). Historically, the Upper Snake Recovery Unit is believed to have largely supported the fluvial life history form; however, many core areas are now isolated or have become fragmented watersheds, resulting in replacement of the fluvial life history with resident or adfluvial forms. The USFWS identified threats to bull trout persistence as "the combined effects of habitat degradation, fragmentation and alterations associated with dewatering, road construction and maintenance, mining, grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species" (64 Federal Register 58910).

3.12.4.4.3.1 Temperature - Requirements and Baseline

Bull trout have different thermal requirements or limitations for their various life stages. If temperatures are above or below threshold for various life-stages fish may avoid areas within streams if they are able or may be killed. The periodicity of each life stage and the accepted stream temperature threshold ranges for various temperature considerations for each species were compiled from regulatory standards and other relevant literature into **Appendix J-2**, a condensed version of which is presented in **Table 3.12-10**.

Table 3.12-10 Bull Trout Temperature Thresholds and Baseline Conditions

Bull Trout Life Stage	Range of Water Temperature Thresholds in degrees Celsius and (season)	Baseline Maximum Summer and Fall Temperature Ranges (degrees Celsius)
Adult Spawning	4-9 (Fall)	13.4 – 19.8
Incubation/Emergence	2-6 (Fall/Winter)	11.1 – 16.2
Juvenile Rearing	4-16 (Year-round)	11.1 – 19.8
Common Summer Habitat Use	6-12 (Summer)	13.4 – 19.8

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum. Baseline temperatures from Brown and Caldwell (2019b: Table C-19).

Using the data in **Table 3.12-10,** stream temperature values, and stream segment lengths from the SPLNT Existing Conditions report (Brown and Caldwell 2018a), the length of mine site streams within these thresholds was estimated (**Table 3.12-11**). Overall, there are 28.99 km of available habitat, (derived from the Occupancy Modeling – **Appendix J-7**) none of it is within optimal thresholds for incubation/emergence, about half of it is optimal for juvenile rearing, approximately 5 percent is within the thresholds for adult spawning, and about 30 percent is optimal for common summer habitat use. The length of potential habitat was based on access and the Occupancy modeling, which is described in Section 3.12.4.4.5, Occupancy Modeling – Bull Trout.

Table 3.12-11 Baseline Stream Length within Water Temperature Threshold Ranges – Bull Trout

Bull Trout Life Stage	Baseline Stream Length within Water Temperature Threshold Range km (percent length within threshold)
Adult Spawning - Field Observed Spawning Temperature	1.61 (5%)[1]
Incubation/Emergence - Optimal	0 (0%)
Juvenile Rearing - Optimal	13.66 (47%)
Common Summer Habitat Use - Optimal	8.66 (30%)
Total Available Habitat	28.99

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum and **Appendix J-7**, Occupancy Modeling Technical Memoranda.

Table Notes:

1 Percent of stream length within modeled potential habitat

km = kilometers (1 km = 0.62 mi).

3.12.4.4.4 DISTRIBUTION

Figure 3.12-10 displays the distribution of bull trout in the analysis area. Bull trout are not found outside of the South Fork Salmon River subbasin within the analysis area (Burns et al. 2005). Bull trout occupy most streams in the proposed mine site (MWH 2017).

A subpopulation of bull trout using an adfluvial life history strategy uses the Yellow Pine pit lake for overwintering, with downstream migration to tributaries for spawning (Hogen and Scarnecchia 2006). Hogen and Scarnecchia (2006) found bull trout overwintered in the large rivers downstream of the EFSFSR (South Fork Salmon River and the Salmon River further downstream), and then migrated upstream to the EFSFSR in June and July, and further into small tributaries to spawn in August and September. Migrants stage at the mouths of presumptive spawning tributaries from mid-July to mid-August, then migrate into tributaries to spawn from mid-August to mid-September. **Appendix J-9** provides more detail regarding bull trout use of the Yellow Pine pit lake.

Fluvial populations downstream from the Yellow Pine pit lake quickly out-migrate as far as the mainstem Salmon River (Hogen and Scarnecchia 2006), or move up to the Yellow Pine pit lake for overwintering. Upstream of the Yellow Pine pit lake, bull trout use either the fluvial or the non-migratory/resident life-history strategy. The extent of available habitat upstream of the Yellow Pine pit lake is limited by gradient barriers. A bull trout population estimate was undertaken at the Yellow Pine pit lake in 2018 and 2019. The 2018 results indicated a bull trout population ranging from 25 to 69 individuals (Brown and Caldwell 2019a). The 2019 results indicated a population range from 45 to 104 individuals, depending on the sampling month (Brown and Caldwell 2020a).

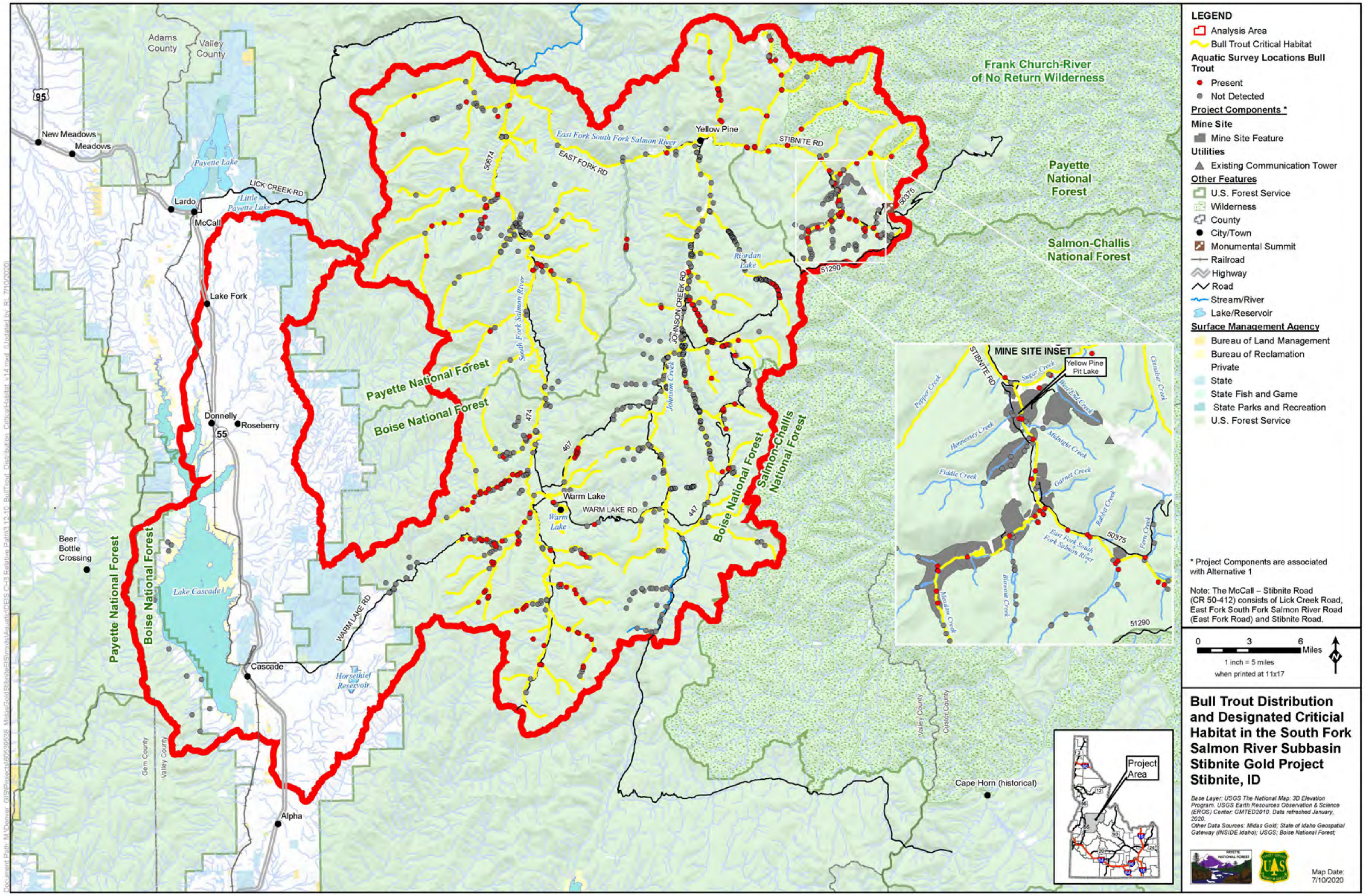

Figure Source: AECOM 2020

Figure 3.12-10 Bull Trout Distribution and Designated Critical Habitat in the South Fork Salmon River Subbasin

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3.12.4.4.5 OCCUPANCY MODELING

Occupancy modeling is a tool used to determine the probability of a fish species occupying a particular stream reach (occupancy probability) and to predict changes in the probability given changes to site physical characteristics (Isaak et al. 2015, 2017). Occupancy modeling quantifies the occupancy probability (expressed as a number in the continuous range of percentages from 0 to 100 percent) of a species occupying a stream reach, and the length of a stream reach (in total kilometers) that has either a low, medium-low, medium-high, or high[4] occupancy probability (referred to as "available habitat" in this section). Greater detail regarding occupancy modeling is presented in **Appendix J-7.**

Occupancy modeling methods originate from studies completed by the Rocky Mountain Research Station, a group of scientists funded by the United States Department of Agriculture (Isaak et al. 2015, 2017). The occupancy modeling was based on three site physical characteristic variables: stream discharge (i.e., flow), summer stream temperature, and reach slope (Isaak et al. 2017). As part of the Rocky Mountain Research Station studies, data on these stream reach variables for large stream networks in the Rocky Mountains/Pacific Northwest were fit to bull trout and westslope cutthroat trout occurrence datasets (presence/absence data) to create parameter estimates used in a logistic regression[5] model. The results of this model can be used to estimate occupancy probabilities for specific areas within any given stream reach where the three site physical characteristic variables are known.

3.12.4.4.5.1 Methods

A site-specific occupancy model (OM) was developed to employ the logistical regression derived from the Rocky Mountain Research Station studies to estimate probabilities for both bull trout and westslope cutthroat trout in three stream reaches within the Headwaters EFSFSR subwatershed (**Appendix J-7**)**:** Stream Reach 1 - EFSRSR from the confluence of Sugar Creek upstream to the confluence of Meadow Creek; Stream Reach 2 - Meadow Creek including the East Fork Meadow Creek; and Stream Reach 3 - EFSFSR upstream of the confluence with Meadow Creek at all tributaries (**Figure 3.12-2**). Stream Reaches 1, 2, and 3 are all within the Headwaters EFSFSR subwatershed (HUC 1706020803; also know as Stream Reach 5) (**Figure 3.12-1**), which is within and adjacent to the footprint of the proposed mine site. Each stream reach included in the model consists of several subreaches further described in Section 3.12.4.7, Watershed Condition Indicators – Mine Site Existing Conditions.

EFSFSR downstream of Sugar Creek (i.e., Stream Reach 4) was not part of OM since it is outside of the proposed mine site. Sugar Creek (i.e., Stream Reach 6), the other subwatershed

[4] These 4 catagories represent the quartiles of the distribution of results within the study area for the OM. Low - reaches with the lowest 25% of occupancy probabilities; medium-low - reaches with the second lowest 25% of occupancy probabiliies; medium-high - reaches with the second-highest 25% of occupancy probabilities; high - reaches with the highest 25% of occupancy probabilities.

[5] Logistic regression is a predictive statistical analysis used to describe the relationship between one binary dependent variable (e.g., presence/absence of native trout species in sample locations in the dataset), and one or more independent variables (e.g., the three stream reach variables presented in this section).

comprising the proposed mine site footprint, was not modeled using the OM analysis approach given the anticipated negligible impact the proposed SGP would have in this subwatershed. However, bull trout are known to occupy Sugar Creek.

The data for each of the three site physical characteristic variables (i.e., stream discharge, summer stream temperature, and reach slope) were sourced from site-specific models and/or datasets. Stream discharge data were modeled using a basin area-to-streamflow regression equation provided by Rio ASE (2019a). Stream temperature data were modeled using QUAL2K, which is a one-dimensional river and stream water quality model, as provided from the SPLNT Existing Conditions Report (Brown and Caldwell 2018a). Stream reach slope data were sourced from a site-specific Lidar dataset by extracting the upstream and downstream endpoint elevations from a digital elevation model, and dividing the difference by stream reach length.

Subreaches within the three stream reaches included in the OM were eliminated from the data set if they were not suitable to sustain bull trout, either due to having a stream discharge less than 0.2 cubic feet per second, being intermittent in flow, or having a channel slope greater than 15 percent.

Table 3.12-12 presents information from the Bull Trout and Westslope Cutthroat Trout Occupancy Modeling Technical Memorandum (**Appendix J-7**) regarding the three variable datasets used in the OM.

Table 3.12-12 Mine Site Occupancy Model Variable Summary

Parameter	Stream Temperature	Stream Flow	Reach Slope
Unit of Measurement	Mean Stream Temperature (degrees C)	Mean Stream Discharge (cfs)	Slope (%)
Temporal Resolution	August (Period of Record)	July 16-Sept. 30 (Period of Record)	Not Applicable
Spatial Resolution	Stream Reaches in Section 3.12.4.4.5, Occupancy Modeling	Stream Reaches in Section 3.12.4.4.5, Occupancy Modeling	Stream Reaches in Section 3.12.4.4.5, Occupancy Modeling
Data Source	SPLNT Model Existing Conditions Report (Brown and Caldwell 2018a)	Basin area-to-streamflow regression equation provided by Rio ASE (2019a)	Delineated in GIS using a 1-meter Lidar DEM
Range in the Mine Site	7.91°C to 11.77°C	0.24 to 18.87 cfs	0.5 to 33.1 percent
Mean in the Mine Site	9.71°C	4.07 cfs	6.9%

Table Source: **Appendix J-7**

Table Notes:

C = Celsius; cfs = Cubic feet per second; DEM = Digital Elevation Model; GIS = Geographic Information Systems; Lidar = Light Detection and Ranging, a remote sensing method; SPLNT = Stream and Pit Lake Network Temperature Model.

3.12.4.4.5.2 Results

Lengths of habitat and distance-weighted occupancy probabilities for bull trout in the entire Headwaters EFSFSR and for each stream reach are presented in **Table 3.12-13**. In total, the Headwaters EFSFSR subwatershed (Stream Reach 5) contains approximately 41.7 km of available habitat for bull trout, which is approximately 74 percent of the total length of streams in that subwatershed (56.7 km).

A distance-weighted average method was used to represent the average occupancy probability for each stream segment. To produce the distance-weighted average, the occupancy probability of each OM reach was multiplied by the proportion of the reach's stream length to the total length of each stream segment that has some likelihood of being occupied by bull trout. Based on the model, the Headwaters EFSFSR subwatershed has an estimated median total occupancy probability for bull trout of 8.31 percent for portions of stream reaches with low to high occupancy probabilities.

Descriptive statistics for lengths of available habitat and occupancy probabilities by stream reach are presented in detail in **Appendix J-7**.

Table 3.12-13 Length of Stream Reach of Available Habitat[1] and Distance Weighted Average Occupancy Probabilities in the Headwaters EFSFSR Occupancy Model for Bull Trout

Occupancy Category	Stream Reach 1- EFSRSR from confluence of Sugar Creek upstream to confluence of Meadow Creek	Stream Reach 2- Meadow Creek including the East Fork Meadow Creek	Stream Reach 3- EFSFSR upstream of the confluence with Meadow Creek at all tributaries	Stream Reach 5- Headwaters EFSFSR subwatershed (Composed of Stream Reaches 1-3)
Low	2.62 km (2.02%)[2]	3.45 km (2.09%)	5.27 km (2.72%)	11.33 km (2.37%)
Medium-Low	2.89 km (4.98%)	6.13 km (4.39%)	3.14 km (4.55%)	12.16 km (4.57%)
Medium-High	8.63 km (8.24%)	5.52 km (11.01)	3.28 km (11.30%)	9.67 km (10.86%)
High	4.08 km (18.19%)	0 km (0%)	4.47 km (19.06%)	8.55 km (18.64%)
Total	10.45 km (9.66%)	15.10 km (6.29%)	16.16 km (9.34%)	41.70 km (8.31%)

Table Source: Bull Trout and Westslope Cutthroat Trout Occupancy Modeling Memorandum (**Appendix J-7**).

Table Notes:

1 Available habitat defined in this section as the length of a stream reach that has either a low, medium-low, medium-high, or high occupancy probability.

2 Percentages in this table represent the distance-weighted occupancy probability for a stream reach length in each occupancy quartile (i.e., category).

Low - reaches with the lowest 25% of occupancy probabilities; Medium-low - reaches with the second lowest 25% of occupancy probabilities; Medium-high - reaches with the second-highest 25% of occupancy probabilities; High - reaches with the highest 25% of occupancy probabilities; km = kilometers (1 km = 0.62 mi)

3.12.4.4.6 STREAM FLOWS (PHYSICAL HABITAT SIMULATION [PHABSIM])

Various analytical techniques were used to estimate baseline and future conditions within the analysis area. This model was used to provide potential future stream flow information based on known baseline flow information. There are no baseline results from this model; however, it is described here as a tool used in the analysis of impacts to fish and fish habitat in Section 4.12, Fish Resources and Fish Habitat, Environmental Consequences. PHABSIM is a modelling technique that predicts the amount of potential fish habitat in a stream or river associated with different volumes of streamflow. First developed by USFWS, the PHABSIM model is widely used as a tool to understand the relationship between streamflow and potential fish habitat. In the late 1980s and early 1990s, the Forest Service conducted a PHABSIM modeling study at several stream locations in the EFSFSR watershed as part of the Snake River Basin Adjudication (see Maret et al. 2006). The results of this previous study are informative in understanding the potential effects of the SGP on fish habitat. PHABSIM was used for bull trout and cutthroat trout because there was not a similar productivity analysis (**Appendix J-5**) as was done for Chinook salmon because that is a NOAA derived method, and therefore has only been completed for ESA species. A summary of the PHABSIM model is provided below. A detailed description of the model and results is provided in **Appendix J-8.**

The PHABSIM model calculates the area of potential fish habitat in a stream for a number of different streamflows. These calculations are based on three physical variables: water depth, water velocity, and substrate composition (i.e., streambed particle size). The model uses discrete values of water depth and velocity data collected at a given stream site to simulate the same variables over a broad range of streamflows of interest. Substrate does not change in the model over the range of simulated flows. For each streamflow of interest, the model converts the simulated physical variables into equivalent values of potential fish habitat. This conversion is based on a functional relationship between the three physical variables and fish habitat suitability. Separate conversions were performed in the model for different species (bull trout and cutthroat trout) and life stages of fish. Model output is expressed as Weighted Usable Area, which represents the square feet of usable habitat per 1,000 feet of stream.

The first step in applying the results of the previous PHABSIM study to the streams at the proposed mine site was to determine which streams from the study could serve as surrogates for the proposed mine site streams. This was accomplished by comparing key site characteristics at the proposed mine site streams to the previous study sitessuch as hydrology and geography. This comparative analysis yielded a general grouping of the PHABSIM study site and proposed mine site streams into three index categories, basically reflecting stream size: Index 1 (small streams); Index 2 (medium size streams); and Index 3 (large streams). At the proposed mine site, each stream reach (defined below in Section 3.12.4.7.3.3, East Fork South Fork Salmon River Watershed Existing Conditions) was assigned to the following indexes:

Index 1:	Stream Reach 3: EFSFSR upstream of Meadow Creek Stream Reach 2: Meadow Creek and East Fork Meadow Creek
Index 2:	Stream Reach 1: EFSFSR between Sugar Creek and Meadow Creek Stream Reach 6: Sugar Creek
Index 3:	Stream Reach 4: EFSFSR between Sugar Creek and Profile Creek

In the case of both Index 1 and 3 streams, only one of the sites from the previous PHABSIM study was determined to be suitable to serve as a surrogate for the proposed mine site streams. Index 2 streams; however, were found to be represented by a number of surrogates, which included a previous PHABSIM study site at the mouth of Sugar Creek, as well as four other stream sites elsewhere in the EFSFSR watershed.

PHABSIM model output generates a significant volume of information on the relationship between streamflow and Weighted Usable Area. To simplify model output for the purposes of evaluating fish habitat effects of the SGP, two refinements were made to the model results. First, the model output used for the proposed mine site centered on the low-flow period of the year, defined as the months of August-March. Second, the Weighted Usable Area for different life stages of bull trout were evaluated for three key streamflows within the low-flow period: the mean discharge rate, a lower rate close to the minimum discharge rate value for the period, and a mid-point rate between the mean and minimum values.

3.12.4.5 Westslope Cutthroat Trout

3.12.4.5.1 STATUS

Due to declines in distribution and abundance, westslope cutthroat trout (cutthroat trout) is designated by the Forest Service as a sensitive species. There was a petition to list westslope cutthroat trout as a threatened species under ESA (63 Federal Register 31691); however, the USFWS determined that such a listing was not warranted (65 Federal Register 20120 April 2000).

3.12.4.5.2 DISTRIBUTION

Figure 3.12-11 displays the distribution of westslope cutthroat trout in the analysis area. Cutthroat trout are not found outside of the South Fork Salmon River subbasin within the analysis area. They are found both upstream and downstream from the Yellow Pine pit lake.

Cutthroat trout spatial and temporal occurrence in the analysis area varies by life stage, (e.g., juveniles using nursery and rearing habitat or spawning adults). Adult migration occurs between mid-March and July with the peak from mid-April to mid-June. Spawning occurs from late April to July when water temperatures are near 10°C (50°F). Peak spawning is between early May and early July. Incubation/emergence occurs between mid-April and September. Juvenile rearing occurs year-round. Emigration occurs between April and December. Life stage periodicity tables are presented in **Appendix J-2**.

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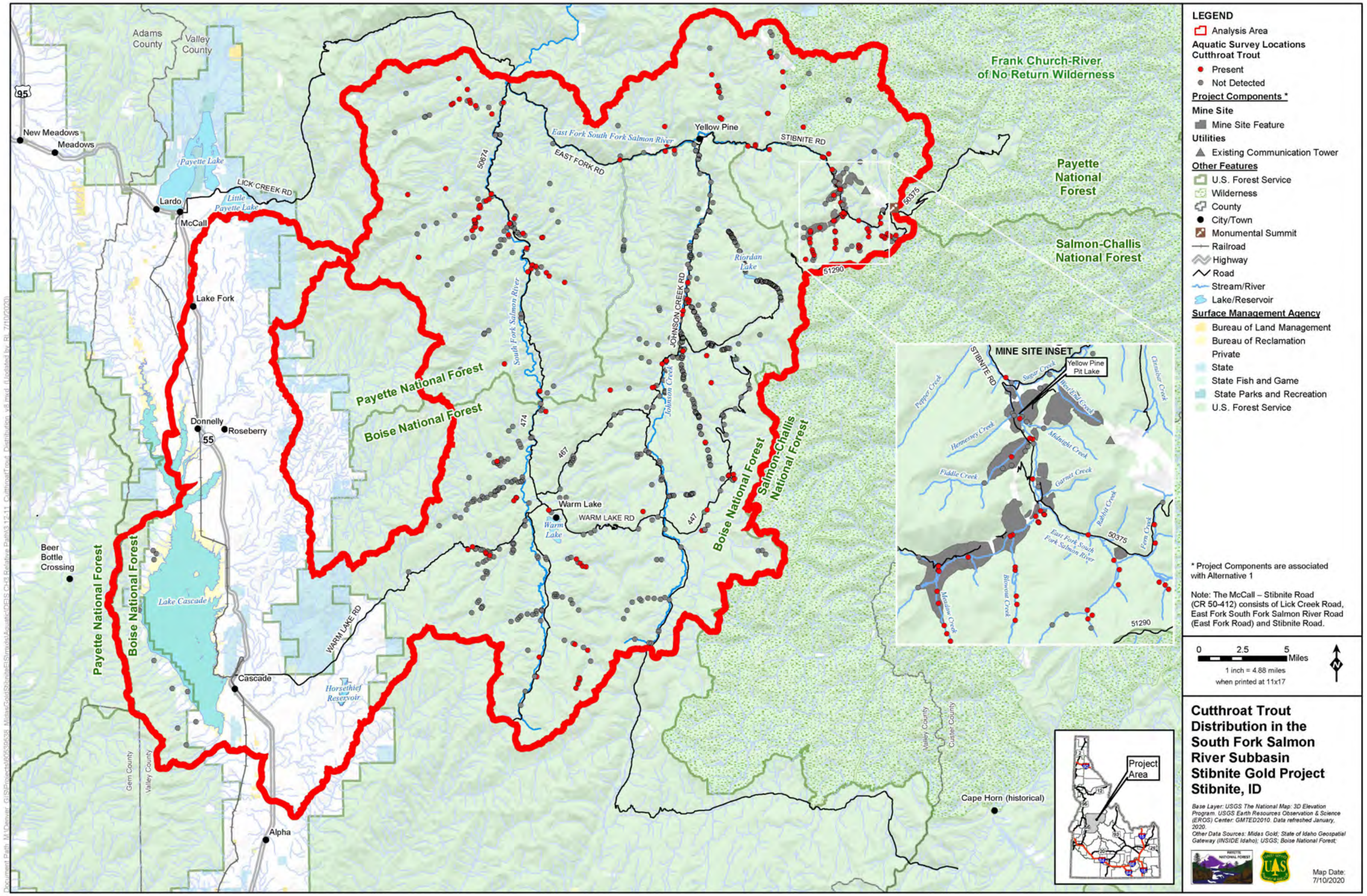

Figure Source: AECOM 2020

Figure 3.12-11 Westslope Cutthroat Trout Distribution in the South Fork Salmon River Subbasin

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Cutthroat trout begin to mature at age three, but usually spawn first at age four or five. Cutthroat trout may be: resident (non-migratory carry out all life processes in tributaries); fluvial (migratory: reside in rivers and streams and migrate to tributaries to spawn); or adfluvial (lake-dwelling and migrate to tributaries to spawn).

Recent (2018-2019) fish sampling was performed in the Yellow Pine pit lake to provide information on relative abundance and movement of cutthroat trout (Brown and Caldwell 2019a, 2020a). A total of 32 cutthroat trout were captured over three sampling events in May, July, and September 2018, leading to only one population estimate of 50 individuals. The movement study results showed the majority of the 32 tagged cutthroat trout remained in the Yellow Pine pit lake; only four moved downstream and were not detected returning upstream. The 2019 study resulted in population estimates ranging from 33 to 101 individuals. The size structure of westslope cutthroat trout was skewed towards larger fish. Fish less than 150 to 200 millimeter fork length were not found.

3.12.4.5.3 OCCUPANCY MODELING

Occupancy modeling was performed for westslope cutthroat trout using the same approach as bull trout (Section 3.12.4.4.5, Occupancy Modeling – Bull Trout). Results are summarized for the entire Headwaters EFSFSR and for each stream reach in **Table 3.12-14**. In total, the Headwaters EFSFSR subwatershed (Stream Reach 5) contains 41.7 km of stream channel that is available habitat for western cutthroat trout (**Table 3.12-14**), which is approximately 74 percent of the total length of streams in the subwatershed (56.7 km). The Headwaters EFSFSR subwatershed has a median total occupancy probability of 63.79 percent for portions of stream reaches with low to high occupancy probabilities (**Table 3.12-14**).

Descriptive statistics for lengths of available habitat and occupancy probabilities by stream reach are presented in detail in **Appendix J-7**.

Table 3.12-14 Length of Stream Reach with Available Habitat[1] in the Headwaters EFSFSR Occupancy Model for Westslope Cutthroat Trout

Occupancy Category	Stream Reach 1- EFSRSR from the confluence of Sugar Creek upstream to the confluence of Meadow Creek	Stream Reach 2- Meadow Creek including the East Fork Meadow Creek	Stream Reach 3- EFSFSR upstream of the confluence with Meadow Creek at all tributaries	Stream Reach 5- Headwaters EFSFSR subwatershed
Low	3.36 km (58.18%)[2]	3.86 km (58.13%)	4.07 km (58.07%)	12.18 km (58.24%)
Medium-Low	2.88 km (62.35%)	5.01 km (63.51%)	5.48 km (62.27%)	13.37 km (62.75%)
Medium-High	1.12 km (67.26%)	3.29 km (67.44%)	3.69 km (66.97%)	8.10 km (67.20%)

Occupancy Category	Stream Reach 1- EFSRSR from the confluence of Sugar Creek upstream to the confluence of Meadow Creek	Stream Reach 2- Meadow Creek including the East Fork Meadow Creek	Stream Reach 3- EFSFSR upstream of the confluence with Meadow Creek at all tributaries	Stream Reach 5- Headwaters EFSFSR subwatershed
High	3.09 km (69.75%)	2.94 km (69.00%)	2.91 km (69.50%)	8.94 km (69.43%)
Total	10.45 km (63.73%)	15.10 km (64.06%)	16.16 km (63.59%)	41.70 km (63.79%)

Table Soucre: Bull Trout and Westslope Cutthroat Trout Occupancy Modeling Memorandum (**Appendix J-7**).

Table Notes:

1 Available habitat defined for this section as the length of a stream reach that has either a low, medium-low, medium-high, or high occupancy probability.

2 Percentages in this table represent the distance-weighted occupancy probability for a stream reach length in each occupancy quartile (i.e., category).

Low - reaches with the lowest 25% of occupancy probabilities; Medium-low - reaches with the second lowest 25% of occupancy probabilities; Medium-high - reaches with the second-highest 25% of occupancy probabilities; High - reaches with the highest 25% of occupancy probabilities; km = kilometer (1 km = 0.62 mi).

3.12.4.5.4 STREAM FLOWS (PHABSIM)

The same PHABSIM approach previously described for bull trout was used for westslope cutthroat trout.

3.12.4.5.5 TEMPERATURE - REQUIREMENTS AND BASELINE

Cutthroat trout have different thermal requirements/limitations for their various life stages. The periodicity of each life stage and the accepted stream temperature thresholds/ranges for various temperature considerations for each species were compiled from regulatory standards and other relevant literature into **Appendix J-2,** a condensed version of which are presented in **Table 3.12-15**.

Table 3.12-15 Cutthroat Trout Temperature Threshold Ranges

Cutthroat Trout Life Stage	Range of Water Temperature Thresholds in degrees Celsius and (season)	Baseline Maximum Summer and Fall Temperatures (degrees Celsius)
Adult Migration	15-20 (Spring)	11.1-16.2
Adult Spawning	4-14 (Spring)	11.1-16.2
Incubation/Emergence	6-10 (Spring/Summer)	11.1-16.2
Juvenile Rearing	10-20 (Year-round)	11.1-19.8

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum. Baseline temperatures from Brown and Caldwell (2019b: Table C-19).

Using the data in **Table 3.12-15,** stream temperature values, and stream segment lengths from the SPLNT Existing Conditions report (Brown and Caldwell 2018a), the length of mine site streams within these thresholds was estimated (**Table 3.12-16**). This table shows 28.98 km of available habitat, nearly all of it is within the optimal temperature range for juvenile rearing (26.62 km or 92%), with only 0.85 km (2.9%) within the adult spawning threshold. The length of potential habitat was based on access and the Occupancy modeling, which is described in more detail in Section 3.12.4.5.3, Occupancy Modeling – Westslope Cutthroat Trout.

Table 3.12-16 Baseline Stream Length within Water Temperature Thresholds – Cutthroat Trout

Cutthroat Trout Life Stage	Baseline Stream Length within Water Temperature Threshold (km)
Adult Spawning - Field Observed Spawning Temperature	0.85 (2.9%)
Juvenile Rearing - Optimal	26.62 (92%)
Total Available Habitat	28.98

Table Source: **Appendix J-2**, Stream Temperature Impacts on Fish Technical Memorandum

Table Notes:

1 Percent of stream length within modeled potential habitat

km = kilometers (1 km = 0.62 mi).

3.12.4.6 Fish Density

Fish density refers to the number of individuals per unit area (i.e., square meters) or volume (cubic meters). In this document, the term “linear density” also is discussed. Linear density as used here is the number of fish per linear length of stream, typically per meter. Because the wetted area of streams varies with flow, it is useful to have a metric that is non-flow dependent, (i.e., stream length).

3.12.4.6.1 METHODOLOGY

Fish abundance data collected during snorkel surveys in the proposed mine site area in 2015 were used in conjunction with fish mark-recapture survey data collected at the same sites at the same time to develop fish relative abundance and density estimates. The objective of comparing snorkeling abundance data to mark-recapture data was to develop a metric that could be applied to the large number of snorkeling sites evaluated from 2012 to 2015, thereby improving the ability to evaluate SGP impacts on the four salmonid species (Section 4.12, Environmental Consequences – Fish Resources and Fish Habitat). The details of how fish densities were derived are included in **Appendix J-10**.

3.12.4.6.2 RESULTS

As stated previously, estimates of existing densities of the four special status fish of management concern can be used to estimate the impacts from the proposed SGP.

3.12.4.6.2.1 Stream Estimates

Several approaches to estimating salmonid densities were applied to the proposed mine site subwatersheds and these approaches are described in detail in MWH 2017 and GeoEngineers 2017. In summary, it was determined that fish densities based on the mark-recapture method represent fair to good estimates of the fish density for most stream reaches evaluated (GeoEngineers 2017). Note that this analysis does not calculate the population size of the South Fork Salmon River MPG. Rather, it determines fish densities that can be used to estimate the salmonid abundance at a specific stream reach at the time of sampling.

Estimated Stream Fish Densities by Species

Table 3.12-17 summarizes the results adjusting the salmonid species areal and linear densities at snorkel survey sites within and adjacent to the proposed mine site subwatersheds from 2012 to 2015.

To estimate the densities of each fish species for purposes of conducting impact assessments (Section 4.12, Environmental Consequences Fish Resources and Fish Habitat), the densities presented in **Table 3.12-17** are allocated among the four special-status species of management concern.

Table 3.12-17 Adjusted Salmonid Species Areal and Linear Densities at Snorkel Survey Sites Within and Adjacent to the Proposed Mine Site Subwatersheds from 2012 to 2015

Site ID (Downstream to Upstream)	Stream	Location	Year(s) Sampled	Mean Site Length (m)/Width (m) for Year(s) Sampled	Mean Fish Density - fish/m² (Mean Fish Linear Density - fish/m) (daytime surveys only-all fish size classes combined)			
					Chinook Salmon	Steelhead/ Rainbow Trout	Bull Trout	Westslope Cutthroat Trout
Downstream of the Yellow Pine pit								
MWH-033	EFSFSR	Upstream of Johnson Creek	2013	100/14.1	0.121 (1.701)	0.084 (1.174)	0.011 (0.148)	0.036 (0.500)
MWH-032	EFSFSR	Downstream of Tamarack Creek	2013, 2014	100/15.9	0.045 (0.675)	0.038 (0.574)	0.011 (0.162)	0.017 (0.250)
MWH-017	Tamarack Creek (control site)	Confluence with EFSFSR	2012-2014	97/5.7	0.017 (0.097)	0.034 (0.195)	0.006 (0.032)	0.038 (0.218)
MWH-009	EFSFSR	Downstream of Sugar Creek	2012, 2014	95.5/8.4	0.059 (0.495)	0.050 (0.417)	0.022 (0.184)	0.014 (0.120)
MWH-029	Sugar Creek	Lower Reach	2012-2014	97/5.5	0.021 (0.116)	0.019 (0.107)	0.029 (0.162)	0.024 (0.134)
MWH-010	Sugar Creek	Middle Reach	2012-2014	97/5.5	0.023 (0.125)	0.024 (0.130)	0.048 (0.260)	0.022 (0.121)
MWH-018	Sugar Creek	Upper Reach	2012-2015	95.2/5.1	0.003 (0.018)	0.011 (0.057)	0.046 (0.234)	0.005 (0.025)
MWH-020	Sugar Creek	Upstream of Cinnabar Creek	2012-2013	95.5/3.6	0.002 (0.007)	0.006 (0.021)	0.080 (0.283)	Not Present
MWH-019	Cinnabar Creek	Lower Reach	2012-2015	93/2.8	Not Present	Not Present	0.095 (0.236)	0.006 (0.014)

Site ID (Downstream to Upstream)	Stream	Location	Year(s) Sampled	Mean Site Length (m)/Width (m) for Year(s) Sampled	Mean Fish Density - fish/m² (Mean Fish Linear Density - fish/m) (daytime surveys only-all fish size classes combined)			
					Chinook Salmon	Steelhead/ Rainbow Trout	Bull Trout	Westslope Cutthroat Trout
MWH-021	Cane Creek	Lower Reach	2012-2013	55.5/3.0	Not Present	Not Present	0.107 (0.316)	Not Present
MWH-030	EFSFSR	Upstream of Sugar Creek	2012-2014	97/6.4	0.088 (0.561)	0.062 (0.394)	0.015 (0.093)	0.020 (0.125)
Upstream of the Yellow Pine pit								
MWH-022	EFSFSR	Upstream of Midnight Creek	2012-2014	80.3/7.8	0.606 (4.707)	Not Present	Not Present	0.009 (0.073)
MWH-023	Fiddle Creek	Lower Reach	2012-2014	97/2.0	Not Present	Not Present	Not Present	0.089 (0.181)
MWH-024	Fiddle Creek	Middle Reach	2012	22/2.0	Not Present	Not Present	Not Present	0.215 (0.430)
MWH-011	EFSFSR	Near Mining Camp	2012-2015	97.8/5.3	0.397 (2.113)	Not Present	Not Present	0.027 (0.142)
MWH-031	Meadow Creek	Upstream of East Fork Confluence	2012	91/4.0	1.852 (7.407)	Not Present	0.004 (0.015)	0.067 (0.267)
MWH-014	Meadow Creek	Stibnite Mine Site	2013-2015	100/5.1	0.783 (4.020)	Not Present	Not Present	0.018 (0.090)
MWH-028	EFMC	Lower Reach	2012-2014	97/2.4	2.573 (6.175)	Not Present	Not Present	0.041 (0.097)
MWH-027	EFMC	Upper Reach	2012-2014	97/1.6	Not Present	Not Present	Not Present	0.027 (0.044)
MWH-015	Meadow Creek	Downstream of DRSF	2012-2014	97/4.8	0.005 (0.023)	Not Present	0.006 (0.028)	0.035 (0.167)

Site ID (Downstream to Upstream)	Stream	Location	Year(s) Sampled	Mean Site Length (m)/Width (m) for Year(s) Sampled	Mean Fish Density - fish/m² (Mean Fish Linear Density - fish/m) (daytime surveys only-all fish size classes combined)			
					Chinook Salmon	Steelhead/ Rainbow Trout	Bull Trout	Westslope Cutthroat Trout
MWH-047	Meadow Creek	Upper DRSF	2013-2015	100/4.3	0.017 (0.072)	Not Present	0.002 (0.009)	0.044 (0.189)
MWH-016	Meadow Creek	Tailings Storage Facility	2012, 2014-2015	97/3.9	Not Present	Not Present	0.005 (0.018)	0.168 (0.654)
MWH-034	Meadow Creek	Upper Reach	2013, 2015	100/3.2	Not Present	Not Present	0.004 (0.013)	0.075 (0.236)
MWH-013	EFSFSR	Near Mining Camp	2012-2014	95.7/4.3	0.014 (0.061)	Not Present	Not Present	0.061 (0.263)
MWH-025	EFSFSR	Middle Reach	2012-2013, 2015	97/4.4	0.020 (0.088)	Not Present	Not Present	0.094 (0.418)
MWH-044	EFSFSR	Stibnite Lodge	2013	100/3.0	Not Present	Not Present	Not Present	0.202 (0.608)
MWH-026	EFSFSR	Stibnite Lodge	2012-2015	97.8/3.3	Not Present	Not Present	Not Present	0.044 (0.145)

Table Source: MWH (2017: Appendix 6)

Table Notes:

Site IDs consisted of reaches ranging in length from 22 to 100 meters in length with most reaches set at 100 meters.

DRSF = Development Rock Storage Facility; EFSFSR = East Fork South Fork Salmon River; EFMC = East Fork Meadow Creek; m = meters (1 m = 3.28 ft)

3.12.4.6.2.2 Yellow Pine Pit Lake Estimates

Mark-recapture studies were undertaken at the Yellow Pine pit lake in 2018 and 2019 to evaluate movements of salmonids and to estimate population abundances (Brown and Caldwell 2019a, 2020a). **Table 3.12-18** summarizes the abundance estimate results. Detailed discussions are included in Brown and Caldwell (2019a, 2020a). No estimates were made for steelhead due to the low numbers captured (i.e., five in 2018 and nine in 2019).

Table 3.12-18 Salmonid Population Abundance Estimates for the Yellow Pine Pit Lake in 2018

Species	Abundance Estimate (n) by Month		
	May	July	September
Bull trout	57	104	82
Westslope Cutthroat Trout	48	48	33
Chinook Salmon	No Tagged Juvenile Fish Returned		

Table Source: Brown and Caldwell 2019a

Table Notes:

Four rainbow trout were tagged but the sample size was too small for an abundance estimate.

The results indicate limited abundance of these salmonids in the Yellow Pine pit lake. Brown and Caldwell (2019a) notes that several hundred whitefish also were captured suggesting the lake can support a large number of fish given suitable habitat.

In 2019, sampling was continued on Yellow Pine pit lake during July, August, and September. The population estimates are provided in **Table 3.12-19** (Brown and Caldwell 2020a).

Table 3.12-19 Salmonid Population Abundance Estimates for the Yellow Pine Pit Lake in 2019

Species	Abundance Estimate (n) by Month		
	July	August	September
Bull Trout	104	45	47
Westslope Cutthroat Trout	67	80	101
Chinook Salmon	No Tagged Juvenile Fish Returned		

Table Source: Brown and Caldwell 2020a

3.12.4.7 Watershed Condition Indicators

3.12.4.7.1 INTRODUCTION

This section summarizes the existing data describing the baseline aquatic habitat conditions that may be affected by the SGP within the analysis area. It includes brief descriptions of the streams that may be affected by the SGP both outside and within the proposed mine site. Watershed condition indicators are used as a metric to compare baseline conditions to estimated changes analyzed in Section 4.12, Fish Resources and Fish Habitat. Over the past 20 years, various fish and aquatic habitat studies have been conducted in the South Fork Salmon River subbasin, and these studies have provided a better understanding of aquatic resource conditions within the analysis area. Studies have been conducted by federal, state, local, and tribal agencies (e.g., PNF, BNF, IDFG, and the Nez Perce Tribe).

Figure 3.12-1 illustrates the watersheds and subwatersheds evaluated. **Table 3.12-20** summarizes the WCI data currently available along with fish species occurrence information for each watershed and subwatershed. Only one subwatershed (Upper Big Creek) in the Cascade Reservoir Watershed had any WCI data available for the local fish community. More WCI data are available for most of the subwatersheds in the Upper South Fork Salmon River, Johnson Creek, Lower East Fork South Fork Salmon River and Upper East Fork South Fork Salmon River watersheds. The data summarized in **Table 3.12-20** are used in Section 4.12, Fish Resources and Fish Habitat – Environmental Consequences, to assess the WCI functionality of each subwatershed when possible.

3.12.4.7.2 Payette and Boise National Forest Management Plans – Appendix B Requirements

The Southwest Idaho Ecogroup Matrix of Pathways and Watershed Condition Indicators (WCIs or “The Matrix”) (Forest Service 2003, 2010a) have been applied to describe and evaluate the baseline environment for fish and aquatic resources in the analysis area. The WCI matrix was developed specifically for application in the PNF and BNF (Forest Service 2003, 2010a) to assist in project design and analysis during National Environmental Policy Act assessments of proposed projects. The WCI matrix evaluates watershed ecological functions by measuring elements that reflect water quality, habitat access, channel conditions and dynamics, flow and hydrology, and other watershed conditions. Furthermore, the WCI matrix comprises a series of “pathways” by which mining, reclamation, or restoration activities can have potential effects on native and desired non-native fish species, their habitats, and associated ecological functions. The same description of the pathways and WCIs can be found in Table B-1, Appendix B of each Forest Plan.

3.12.4.7.3 ANALYSIS AREA

Table 3.12-20 summarizes the WCIs for fish in each subwatershed (HUC 6th Field) within the analysis area that could be directly impacted by the proposed SGP. Where subwatersheds do not have WCIs determined, the special status salmonids known to be present are listed for the benefit of the reader.

3.12.4.7.3.1 North Fork Payette River Subbasin Baseline

The Cascade Reservoir Watershed is the only HUC 5th Field watershed in this subbasin (**Figure 3.12-1**; **Table 3.12-20**). Eight subwatersheds occur in this watershed that could be impacted by the SGP. Only one subwatershed, Upper Big Creek, has had a WCI analysis completed. Many of the other subwatersheds are on private land and do not have WCIs completed. None of the four special status salmonids currently occur in the Cascade Reservoir Watershed, although historical records indicate that both Chinook salmon and steelhead occupied this watershed prior to downstream dam construction that prevented upstream fish passage.

SGP activities in the Cascade Reservoir Watershed would be primarily transportation-related uses of the established state and county road systems, the use of land for power substations and transmission lines, supply, and office facilities.

3.12.4.7.3.2 South Fork Salmon River Subbasin Baseline

Baseline conditions for WCIs were developed per the guidance in Appendix B of the Forest Plans (Forest Service 2003, 2010a) to describe the existing conditions in the South Fork Salmon River subbasin. **Table 3.12-20** summarizes the baseline WCI information for the South Fork Salmon River subbasin for those watersheds and subwatersheds that may be directly impacted by proposed SGP activities. Mining operations at the proposed mine site, or new road construction along the proposed Burntlog Route are examples of activities that could cause impacts that merit inclusion of affected watersheds and subwatershed in the table.
Table 3.12-20 includes watersheds and subwatersheds that could have impacts, for example transportation routes and transmission lines.

Table 3.12-20 Baseline Watershed Condition Indicators for Potentially Impacted Watersheds and Subwatersheds in the Analysis Area

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins										
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site										
	Cascade Reservoir Watershed (HUC 5th Field)								Upper South Fork Salmon River Watershed (HUC 5th Field)		
	Subwatersheds (HUC 6th Field)										
	Lake Fork	Boulder Creek	Lower Gold Fork River	Duck Creek	Beaver Creek	Pearsol Creek	Lower Big Creek	Upper Big Creek	Curtis Creek	Six-bit Creek	Warm Lake Creek
Bull Trout Local Population Characteristics within Core Area											
Local Population Size	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	FR	Bull Trout Present. No Data	FR
Growth and Survival	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Life History Diversity and Isolation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Persistence and Genetic Integrity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Water Quality											
Temperature (steelhead, Chinook)	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	Species Not Present	FR	Steelhead Present. No Data	FUR
Temperature (bull trout)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FUR
Temperature (other fish species, i.e., westslope cutthroat trout)	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present. Rated FA For other fish species	WSC Present. No Data	WSC Present. No Data	WSC Present. No Data
Sediment/Turbidity (steelhead, Chinook)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Sediment/Turbidity (bull trout)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Sediment/Turbidity (other fish species, i.e., westslope cutthroat trout)	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present	WSC Not Present. Rated FUR for other fish species	No Data	No Data	N/A
Chemical Contamination / Nutrients	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FR	No Data	FR
Habitat Access											
Physical Barriers	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FUR	FA	No Data	FR
Habitat Elements											
Substrate Embeddedness (bull trout rearing areas)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FUR
Large Woody Debris	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FA	FA	No Data	FA

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins										
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site										
	Cascade Reservoir Watershed (HUC 5th Field)								Upper South Fork Salmon River Watershed (HUC 5th Field)		
	Subwatersheds (HUC 6th Field)										
	Lake Fork	Boulder Creek	Lower Gold Fork River	Duck Creek	Beaver Creek	Pearsol Creek	Lower Big Creek	Upper Big Creek	Curtis Creek	Six-bit Creek	Warm Lake Creek
Pool Frequency and Quality	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FA	No Data	FR
Large Pools/Pool Quality (all fish species in adult holding, juvenile rearing, and over wintering reaches)	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FUR	FA	No Data	FR
Off-Channel Habitat	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FA	FA	No Data	FR
Refugia (steelhead, Chinook)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Refugia (bull trout)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FR	No Data	FR
Channel Conditions and Dynamics											
Average Wetted Width/Maximum Depth Ratio	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FA	No Data	FR
Streambank Condition	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FA	FA	No Data	FR
Floodplain Connectivity	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FUR	No Data	FUR
Flow/Hydrology											
Change in Peak/Base Flows	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FA	FA	No Data	FUR
Change in Drainage Network	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FUR	FUR	No Data	FUR
Watershed Conditions											
Road Density/Location	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FUR	FUR	No Data	FR
Disturbance History	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FUR	No Data	FUR
Riparian Conservation Areas	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FR	No Data	FUR
Disturbance Regime	No Data	No Data	No Data	No Data	No Data	No Data	No Data	FR	FR	No Data	FR
Integration of Pathways											
Integration of Pathways (steelhead, Chinook)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FUR	FR	No Data	FUR
Integration of Pathways (bull trout)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FUR	FR	No Data	FUR
Integration of Pathways (other fish species, i.e., westslope cutthroat trout)	No Data	No Data	No Data	No Data	No Data	No Data	No Data	WSC not Present. Rated FUR for other fish species	FR	No Data No Data	FUR

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Bull Trout Local Population Characteristics within Core Area																
Local Population Size	FUR	FUR	FUR	FA	Bull Trout Present No Data	FA	Bull Trout Present No Data	FR	FR	FR	Bull Trout Present No Data	Bull Trout Present No Data	Bull Trout Present No Data	Bull Trout Present. No Data	FR	FR
Growth and Survival	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Life History Diversity and Isolation	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Persistence and Genetic Integrity	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Water Quality																
Temperature (steelhead, Chinook)	FUR	FUR	FUR	FR	Steelhead Present. No Data	FA	Steelhead and Chinook Present No Data	FUR	Species Not Present	FR	Steelhead Present. No Data	Chinook Present. No Data	FR	Species Not Present	FR	FR
Temperature (bull trout)	FUR	FUR	FUR	FR	No Data	FA	No Data	FUR	FUR	FR	No Data	FR	FR	No Data	FR	FR
Temperature (other fish species, i.e., westslope cutthroat trout)	No WSC. No Data for other fish species	WSC Present. No Data	No WSC. No Data for other fish species	WSC Present. No Data	WSC Present No Data	WSC Present. No Data	WSC Present. No Data	WSC Present No WCI	WSC Present. No Data	WSC Present. No Data	WSC Present No Data	WSC Present No Data	WSC Present No Data	WSC Present No Data	WSC Present. No Data	WSC Present. No Data
Sediment/Turbidity (steelhead, Chinook)	FUR	FUR	FA	FA	Steelhead Present. No Data	FUR	No Data	FUR	N/A	No Data	No Data	No Data	No Data	N/A	FUR	FUR

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Sediment/Turbidity (bull trout)	FUR	FUR	FA	FA	No Data	FUR	No Data	FUR	FR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Sediment/Turbidity (other fish species, i.e., westslope cutthroat trout)	No WSC. No Data for other fish species	WSC Present. No Data	No WSC. No Data for other fish species	WSC Present. No Data	No Data	No Data	No Data	No Data I	FR	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Chemical Contamination/ Nutrients	FA	FR	FA	FA	No Data	FA	No Data	FA	FR	FUR	No Data	No Data	No Data	No Data	FUR	FUR
Habitat Access																
Physical Barriers	FUR	FA	FUR	FA	No Data	FUR	No Data	FA	FUR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Habitat Elements																
Substrate Embeddedness (bull trout rearing areas)	FUR	FUR	FA	FA	No Data	FA	No Data	FUR	FR	FR	No Data	FA	FUR	No Data	FA	FA
Large Woody Debris	FA	FA	FA	FA	No Data	FA	No Data	FA	FUR	FUR	No Data	No Data	No Data	No Data	FA	FA
Pool Frequency and Quality	FA	FA	FA	FA	No Data	FA	No Data	FA	FUR	FR	No Data	No Data	No Data	No Data	FR	FR
Large Pools/Pool Quality (all fish species in adult holding, juvenile rearing, and over wintering reaches)	FUR	FUR	FUR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Off-Channel Habitat	FA	FA	FA	FA	No Data	FA	No Data	FA	FA	FR	No Data	No Data	No Data	No Data	FR	FR
Refugia (steelhead, Chinook)	FR	FR	FR	FR	No Data	FR	No Data	FR	No Data	FR	No Data	No Data	No Data	N/A	FR	FR
Refugia (bull trout)	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	FA	No Data	FR	FR

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Channel Conditions and Dynamics																
Average Wetted Width/Maximum Depth Ratio	FA	FR	FA	FA	No Data	FA	No Data	FA	FR	FR	FA	No Data	No Data	FA	FA	FA
Streambank Condition	FUR	FR	FA	FA	No Data	FA	No Data	FA	FR	FR	No Data	No Data	No Data	No Data	FA	FA
Floodplain Connectivity	FR	FR	FR	FR	No Data	FR	No Data	FA	FR	FR	FR	FR	No WCI	No WCI	FR	FR
Flow/Hydrology																
Change in Peak/Base Flows	FR	FUR	FA	FUR	No Data	FUR	No Data	FUR	FUR	FR	No Data	FR	No Data	No Data	FA	FA
Change in Drainage Network	FR	FR	FR	FR	No Data	FR	No Data	FA	FR	FUR	No Data	No Data	No Data	No Data	FA	FA
Watershed Conditions																
Road Density/Location	FR	FR	FR	FR	No Data	FR	No Data	FA	FR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Disturbance History	FUR	FUR	FA	FUR	No Data	FUR	No Data	FUR	FUR	FUR	No Data	No Data	No Data	No Data	FR	FR
Riparian Conservation Areas	FR	FA	FR	FR	No Data	FR	No Data	FR	FR	FUR	FUR	FUR	No Data	No Data	FA	FA
Disturbance Regime	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	FUR	FUR	No WCI	No WCI	FR	FR
Integration of Pathways																
Integration of Pathways (steelhead, Chinook)	FUR	FUR	FUR	FR	No Data	FR	No Data	FR	NA	FR	No Data	No Data	No Data	N/A	FR	FR
Integration of Pathways (bull trout)	FUR	FUR	FUR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Integration of Pathways (other fish species, i.e., westslope cutthroat trout)	No WSC. Rated FUR For other fish species	FUR	No WSC. Rated FUR For other fish species	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Bull Trout Local Population Characteristics within Core Area																
Local Population Size	FUR	FUR	FUR	FA	Bull Trout Present No Data	FA	Bull Trout Present No Data	FR	FR	FR	Bull Trout Present No Data	Bull Trout Present No Data	Bull Trout Present No Data	Bull Trout Present. No Data	FR	FR
Growth and Survival	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Life History Diversity and Isolation	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Persistence and Genetic Integrity	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR
Water Quality																
Temperature (steelhead, Chinook)	FUR	FUR	FUR	FR	Steelhead Present. No Data	FA	Steelhead and Chinook Present No Data	FUR	Species Not Present	FR	Steelhead Present. No Data	Chinook Present. No Data	FR	Species Not Present	FR	FR
Temperature (bull trout)	FUR	FUR	FUR	FR	No Data	FA	No Data	FUR	FUR	FR	No Data	FR	FR	No Data	FR	FR
Temperature (other fish species, i.e., westslope cutthroat trout)	No WSC. No Data for other fish species	WSC Present. No Data	No WSC. No Data for other fish species	WSC Present. No Data	WSC Present No Data	WSC Present. No Data	WSC Present. No Data	WSC Present No WCI	WSC Present. No Data	WSC Present. No Data	WSC Present No Data	WSC Present No Data	WSC Present No Data	WSC Present No Data	WSC Present. No Data	WSC Present. No Data

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Sediment/Turbidity (steelhead, Chinook)	FUR	FUR	FA	FA	Steelhead Present. No Data	FUR	No Data	FUR	N/A	No Data	No Data	No Data	No Data	NA	FUR	FUR
Sediment/Turbidity (bull trout)	FUR	FUR	FA	FA	No Data	FUR	No Data	FUR	FR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Sediment/Turbidity (other fish species, i.e., westslope cutthroat trout)	No WSC. No Data for other fish species	WSC Present. No Data	No WSC. No Data for other fish species	WSC Present. No Data	No Data	No Data	No Data	No Data I	FR	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Chemical Contamination/ Nutrients	FA	FR	FA	FA	No Data	FA	No Data	FA	FR	FUR	No Data	No Data	No Data	No Data	FUR	FUR
Habitat Access																
Physical Barriers	FUR	FA	FUR	FA	No Data	FUR	No Data	FA	FUR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Habitat Elements																
Substrate Embeddedness (bull trout rearing areas)	FUR	FUR	FA	FA	No Data	FA	No Data	FUR	FR	FR	No Data	FA	FUR	No Data	FA	FA
Large Woody Debris	FA	FA	FA	FA	No Data	FA	No Data	FA	FUR	FUR	No Data	No Data	No Data	No Data	FA	FA
Pool Frequency and Quality	FA	FA	FA	FA	No Data	FA	No Data	FA	FUR	FR	No Data	No Data	No Data	No Data	FR	FR
Large Pools/Pool Quality (all fish species in adult holding, juvenile rearing, and over wintering reaches)	FUR	FUR	FUR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Off-Channel Habitat	FA	FA	FA	FA	No Data	FA	No Data	FA	FA	FR	No Data	No Data	No Data	No Data	FR	FR
Refugia (steelhead, Chinook)	FR	FR	FR	FR	No Data	FR	No Data	FR	No Data	FR	No Data	No Data	No Data	NA	FR	FR

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Refugia (bull trout)	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	FA	No Data	FR	FR
Channel Conditions and Dynamics																
Average Wetted Width/Maximum Depth Ratio	FA	FR	FA	FA	No Data	FA	No Data	FA	FR	FR	FA	No Data	No Data	FA	FA	FA
Streambank Condition	FUR	FR	FA	FA	No Data	FA	No Data	FA	FR	FR	No Data	No Data	No Data	No Data	FA	FA
Floodplain Connectivity	FR	FR	FR	FR	No Data	FR	No Data	FA	FR	FR	FR	FR	No WCI	No WCI	FR	FR
Flow/Hydrology																
Change in Peak/Base Flows	FR	FUR	FA	FUR	No Data	FUR	No Data	FUR	FUR	FR	No Data	FR	No Data	No Data	FA	FA
Change in Drainage Network	FR	FR	FR	FR	No Data	FR	No Data	FA	FR	FUR	No Data	No Data	No Data	No Data	FA	FA
Watershed Conditions																
Road Density/Location	FR	FR	FR	FR	No Data	FR	No Data	FA	FR	FR	No Data	No Data	No Data	No Data	FUR	FUR
Disturbance History	FUR	FUR	FA	FUR	No Data	FUR	No Data	FUR	FUR	FUR	No Data	No Data	No Data	No Data	FR	FR
Riparian Conservation Areas	FR	FA	FR	FR	No Data	FR	No Data	FR	FR	FUR	FUR	FUR	No Data	No Data	FA	FA
Disturbance Regime	FR	FR	FR	FR	No Data	FR	No Data	FR	FR	FR	FUR	FUR	No WCI	No WCI	FR	FR
Integration of Pathways																
Integration of Pathways (steelhead, Chinook)	FUR	FUR	FUR	FR	No Data	FR	No Data	FR	N/A	FR	No Data	No Data	No Data	N/A	FR	FR
Integration of Pathways (bull trout)	FUR	FUR	FUR	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR

Watershed Condition Indicator	North Fork Payette River and South Fork Salmon River Subbasins															
	Watersheds and Subwatersheds Outside of the Mine Site and Within the Mine Site															
	Johnson Creek Watershed (HUC 5th Field)									Lower East Fork South Fork Salmon River Watershed (HUC 5th Field)	Upper East Fork South Fork Salmon River Watershed (HUC 5th Field)					
											Subwatersheds Outside of the Mine Site				Subwatersheds Within the Mine Site	
	Subwatersheds (HUC 6th Field)															
	Lunch Creek	Headwaters Johnson Creek	Sheep Creek	Burnt Log Creek	Dutch/ Ditch Creek	Trapper Creek	Upper Indian Creek	Riordan Creek	Porcupine Creek	Lower EFSFSR (HUC 5TH)	Quartz Creek	Profile Creek	Tamarack Creek	No Mans Creek	Sugar Creek	Headwaters EFSFSR
Integration of Pathways (other fish species, i.e., westslope cutthroat trout)	No WSC. Rated FUR For other fish species	FUR	No WSC. Rated FUR For other fish species	FR	No Data	FR	No Data	FR	FR	FR	No Data	No Data	No Data	No Data	FR	FR

Table Source: Forest Service 2010a: Johnson Creek Watershed Improvement Project-Boise NF: Attachment B, Subwatersheds Baselines; Forest Service 2012; Foust and Nalder 2010; Rio ASE 2019a; StreamNet 2020

Table Notes:

WCI thresholds used are from Rio ASE 2019a.

FA = Functioning Appropriately
FR = Functioning at Risk
FUR = Functioning at Unacceptable Risk
WSC = westslope cutthroat trout
WCI = Watershed Condition Indicator
N/A = Not Applicable

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3.12.4.7.3.3 East Fork South Fork Salmon River Watershed Baseline

General Overview of Upper EFSFSR Watershed Conditions

The EFSFSR watershed covers approximately 250,000 acres and enters the mainstem South Fork Salmon River near the confluence of the Secesh River. Most of the watershed is administered by the Forest Service, with National Forest System lands managed by the PNF and BNF. Private land in the watershed includes small parcels of land along Johnson Creek, large legacy mines in the headwater drainages (e.g., Stibnite and Cinnabar mines), and the village of Yellow Pine. Predominant historical land uses occurring in this watershed include timber harvest and large-scale mining (Wagoner and Burns 2001 *in* NMFS 2016). Extensive cattle grazing also historically occurred in the Johnson Creek watershed, but federal grazing allotments have now been retired and grazing has been reduced to private lands.

Large-scale historical mining altered stream channel conditions in the Upper EFSFSR watershed. The Forest Service and mine operators have since undertaken restoration work. However, habitat for migratory salmonids in the EFSFSR upstream of the Yellow Pine pit lake is inaccessible because historical mining excavation of the stream channel has created a gradient barrier (Yellow Pine pit lake cascade). Although there has been a reduction in human influences since about 1950, there are still significant legacy effects that continue to impact channel conditions and fish populations. Kuzis (1997) describes the Upper EFSFSR watershed as follows.

> "The most significant geophysical processes affecting channels in the EFSFSR are mass wasting and erosion. The most obvious impacts to stream channels are located at the Yellow Pine pit lake, Meadow Creek, East Fork Meadow Creek, and the Cinnabar Mine area."

The EFSFSR drainage has the lowest quality habitat for sensitive and protected fish in the South Fork Salmon River subbasin (Northwest Power Conservation Council 2004). Primary habitat limitations in the EFSFSR drainage are reduced riparian habitat and decreased streambank stability due both to road design and the extent of the existing road system; secondary limitations include reduced instream large woody debris, water quality degradation, and fish passage barriers resulting from legacy mining in the area (Northwest Power Conservation Council 2004).

All IDEQ-inventoried waterbodies at the proposed mine site (except for West End Creek) are listed under Section 303(d) of the federal Clean Water Act as "impaired" due to water quality. The causes for listing of these waters are associated with elevated concentrations of arsenic, antimony, and mercury. Each of the 303(d)-listed waterbodies has designated beneficial uses of "cold water communities," "salmonid spawning," and "primary contact recreation," and all (except Sugar Creek) have designated beneficial uses of "drinking water supply."

Wildfires have eliminated much of the tree canopy at the proposed mine site and vicinity. Although much of the understory vegetation in burned areas has started to regenerate, substantial erosion still occurs (HDR 2013). In addition, the failure of a dam on the East Fork Meadow Creek (Blowout Creek) in 1965 resulted in extensive erosion, both upstream and downstream from the former dam and reservoir site, which in turn has lead to extensive and ongoing deposition of sediment in the lower reaches of Meadow Creek and downstream in the EFSFSR. Currently, while concentrations of total suspended solids and turbidity are low during some months, there is seasonal variation in these concentrations associated with high flow periods when concentrations can reach moderate to high levels.

An assessment of most of the WCIs for the proposed mine site was prepared for six stream reaches, illustrated in **Figures 3.12-2** (Rio ASE 2019b). This assessment is presented **Table 3.12-21** Mine Site Stream Reaches Baseline Summary of Watershed Condition Indicators below.

Mine Site Baseline

To better understand the existing conditions, the two subwatersheds that comprise the proposed mine site, Sugar Creek and the Headwaters East Fork South Fork Salmon River, were further divided into six stream reaches. These stream reaches are described in more detail below followed by a summary of baseline WCIs for each reach.

Stream Reach 1: EFSFSR and Tributaries from Sugar Creek Upstream to Meadow Creek

East Fork South Fork Salmon River

The EFSFSR is a tributary to the South Fork Salmon River. EFSFSR Stream Reach 1 is 6.1 km between its confluence with Sugar Creek upstream to the confluence with Meadow Creek. This stream reach includes the Yellow Pine pit lake, immediately upstream of which is a long cascade (22 percent gradient) that presents a complete upstream passage barrier for all fish species including migrating Chinook salmon and steelhead. Despite the migratory barrier at the Yellow Pine pit lake, bull trout and westslope cutthroat trout are known to occur upstream of the Yellow Pine pit lake. Chinook salmon also spawn and rear in the stream reach upstream of the lake because they have been introduced there by the IDFG. Downstream of the Yellow Pine pit lake, this stream reach is accessible to all four special status salmonid species.

Between Meadow Creek and the Yellow Pine pit lake, the EFSFSR widens and has larger streambed material (including abundant cobble and boulders), relative to the upper EFSFSR. This stream reach has moderate to high stream gradients (approximately 2 to 8 percent) (HDR 2016). Moving downstream to the confluence with Sugar Creek, the EFSFSR is similar in width, gradient, and substrate material as upstream, but many of the larger boulders and cobble are sharp and more angular. Based on field surveys conducted by Rio ASE and reported in the Stream Functional Assessment (Rio ASE 2019b), there are more, and deeper pools upstream of the Yellow Pine pit lake. The EFSFSR generally supports a healthy riparian corridor, with the exception of areas near the Yellow Pine pit lake and areas of legacy mine waste dumps along the banks upstream and downstream of the Yellow Pine pit lake.

The EFSFSR in this reach has been heavily impacted by legacy mining activities. In addition to the Yellow Pine pit lake, a remnant of legacy mining activities, these impacts include waste rock dumps in and adjacent to the stream channel, tailings washed down from Meadow Creek valley, roads and infrastructure within and adjacent to the EFSFSR channel, dam construction across the EFSFSR main channel, and other legacy impacts (Midas Gold 2016).

Hennessy Creek

Hennessy Creek historically flowed into the EFSFSR downstream of the Yellow Pine pit lake, but it has been diverted to flow into the EFSFSR downstream of Sugar Creek. It is a narrow, low-flow stream that flows in a constructed ditch alongside McCall-Stibnite Road (County Road [CR] 50-412), and then through a subterranean section under an adjacent waste rock dump before passing through a very high-gradient reach into the EFSFSR. The creek is not expected to support upstream fish passage because of an average channel gradient of 37 percent at its mouth (HDR 2016). Hennessy Creek is densely vegetated and shallow. The lower portion of Hennessy Creek has been significantly impacted by legacy mine-related activities, including stream diversion, road construction that buried the stream channel, and mining infrastructure (Midas Gold 2016).

Yellow Pine Pit Lake

During mining activities during the 1930s through the 1950s, the nearly 5-acre Yellow Pine pit lake was created by open pit mining while the EFSFSR was diverted through the Bradley Tunnel to Sugar Creek (Hogen 2002 *in* MWH 2017). After mining ceased in 1952, the EFSFSR was allowed to flow through the abandoned mine pit. The pit currently has a maximum depth of approximately 11 meters. Diverting the EFSFSR back into the stream channel and pit created a long riffle cascade with a high (22 percent) gradient that precluded fish passage upstream into the upper watershed. Therefore, all streams upstream of the Yellow Pine pit lake are naturally inaccessible to anadromous Chinook salmon and steelhead without human intervention. The Yellow Pine pit lake is used by both fish and mammals, including Chinook salmon, bull trout, and river otters. Mountain whitefish are abundant in the lake (Brown and Caldwell 2018a and 2020b) and it supports a healthy benthic macroinvertebrate community (IDEQ 2002). Bull trout found in the Yellow Pine pit lake may be either resident (Brown and Caldwell 2020a) and/or an adfluvial life history population that use the Yellow Pine pit lake for overwintering, with downstream migration to tributaries for spawning (Hogen and Scarnecchia 2006).

The Yellow Pine pit lake is the largest feature that affects flow rates in the EFSFSR; however, because of its small area, it affects low flows only slightly and does not affect high flows at all (Kuzis 1997). The lake also displays thermal stratification (i.e., order), but resuspension of sediments due to turnover is not expected. The bottom velocities necessary for turnover would not be high enough for resuspension (IDEQ 2002). Fish sampling in the Yellow Pine pit lake was not included in the habitat-related aquatic baseline studies conducted by HDR (2016) or MWH (2017).

Midnight Creek

Midnight Creek is a small tributary of the EFSFSR. The lower portion of the creek is characterized as a narrow channel with extremely high gradient (approximately 90 percent) and dense overhanging vegetation. The high gradient presents a complete fish passage barrier to fish (HDR 2016). Midnight Creek has been impacted by legacy mining activities, including open-pit mining, waste rock dumps, and road construction (Midas Gold 2016).

Midnight Creek was not included in the preliminary baseline study due to restricted access, but it was surveyed by Great Ecology (2018) in the supplemental assessment. There is no baseline fish use noted for Midnight Creek (MWH 2017).

Fiddle Creek

Fiddle Creek is a small tributary of the EFSFSR just upstream of Midnight Creek. Habitat conditions in the creek have been adversely impacted from legacy mining operations, road construction, and culvert installation (Midas Gold 2016). Fiddle Creek also was the site of a former water storage reservoir, the construction and operation of which degraded portions of the stream.

The lower reach of Fiddle Creek has an approximate 37 percent gradient where it flows into the EFSFSR, creating a complete barrier to upstream fish passage (HDR 2016). Upstream of this barrier, Fiddle Creek retains a relatively high gradient in a relatively narrow channel, with side channels (HDR 2016). The creek has a thick tall-shrub overstory dominated by gray alder (*Alnus incana*) (HDR 2016). The uppermost section of Fiddle Creek flattens in gradient, becoming a slower meandering stream where the reservoir formerly existed. Large amounts of large woody debris occur throughout the creek, and the dominant streambed substrate consists of boulders, large cobble, and gravel (HDR 2016). Westslope cutthroat trout were the only salmonids observed in Fiddle Creek or detected in eDNA surveys (MWH 2017).

Garnet Creek

Garnet Creek is a narrow, shallow, moderate-gradient tributary to EFSFSR approximately 0.5 kilometer downstream from the Meadow Creek confluence. The creek has been severely modified over the past 100 years to accommodate mining-related activities. It is still influenced by legacy mining infrastructure that was located across and adjacent to the stream channel, including portions of a town site; and is currently routed through several man-made ditches (Midas Gold 2016). Garnet Creek flows through a 26-meter-long corrugated metal pipe culvert near its confluence with the EFSFSR that presents a partial barrier to fish (HDR 2016).

Garnet Creek was surveyed by Great Ecology (2018) in a supplemental assessment. Garnet Creek cuts through a formerly burned hillside. Most of the vegetative cover along the creek is composed of grasses; however, shrubs and trees grow alongside its banks, and woody vegetation is found in the channel (MWH 2017). There is no baseline fish use noted for Garnet Creek (MWH 2017).

Stream Reach 2: Meadow Creek and East Fork Meadow Creek

Lower and Middle Meadow Creek

Meadow Creek is a major tributary to the EFSFSR that flows through a flat-bottomed valley surrounded by steep mountains. Elevations range from 1.9 km above sea level in the lower reach to over 2.3 km in the headwaters. Meadow Creek has been heavily impacted by legacy mining-related activities, including deposition of tailings and spent heap leach ore, ore processing facilities, heap leach pads, and other infrastructure, stream relocation into a straightened riprap channel, and construction of an airstrip (Midas Gold 2016). The downstream end of the valley shows remnant effects from early mining activities, along with a large outwash feature created by a dam failure in the East Fork Meadow Creek drainage south of the site of the Meadow Creek Mine. Portions of the creek have been modified over the years to improve conditions caused by past mining operations, including the regrading and revegetation of the 2 percent gradient lower reach of the creek in 2004 and 2005.

The middle reach of Meadow Creek is an engineered channel that was constructed to bypass the SODA. The channel was lined with riprap over geotextile fabric, and is confined between reinforced/engineered slopes with a gradient of less than 2 percent. This reach has a short section with a 9 percent gradient, shallow depths, and few pools, which may be a partial fish migration barrier at low flows. The channel includes low-gradient riffles, glides (section of the stream coming out of a pool), and runs. There is no side channel development or potential large woody debris recruitment.

East Fork Meadow Creek

The EFMC, also known as “Blowout Creek,” is a tributary to Meadow Creek that has been severely impacted as a result of legacy mining-related activities and the failure of a dam that had been constructed across its stream channel (Midas Gold 2016). The dam was constructed in 1929 to supply hydroelectric power for historical milling operations. The dam failed in 1965 due to record snow melt and runoff rates, depositing large volumes of sediment into Meadow Creek, the EFSFSR, and the Yellow Pine pit lake (URS Corporation 2000 *in* MWH 2017). This stream is considered to be the largest source of sediment to the EFSFSR in the analysis area.

The middle reach of EFMC flows through a lateral glacial moraine that eroded during the dam failure and is still considered unstable as it continues to deposit sediments into Meadow Creek and the EFSFSR. Upstream of this middle reach, EFMC has a low-gradient pool-riffle reach flowing through a large meadow. This reach is incised and continues to headcut in response to the dam failure. There are few trees and the banks have abundant grasses. The dominant streambed material is sand and gravel (MWH 2017). The EFMC headwaters are high gradient (4 to 20 percent) with cascades, high-gradient riffle, and plunge-pool habitat.

Immediately downstream of the historical dam location, the creek has a slightly steeper (8 to 20 percent) gradient, and is composed of cascade habitat. Near the confluence with Meadow Creek, the EFMC passes through a multi-thread and unconfined alluvial fan with a 4 to 8 percent gradient.

Sediment from the unstable slopes immediately upstream may contribute to the formation and maintenance of this alluvial fan.

Upper Meadow Creek

Upper Meadow Creek encompasses the headwaters downstream to the location of proposed Hangar Flats Development Rock Storage Facility. Upper Meadow Creek is confined and high gradient at the most upstream extent and low gradient and unconfined immediately upstream of the SODA in lower Meadow Creek, transitioning from a gradient of 4 to 8 percent to 2 to 4 percent. Habitat is composed of riffles, step runs (sequence of runs separated by shorter riffle steps)., and pools. The presence of side channels in some portions provide potential for lateral channel movement in the less confined sections. Immediately upstream of the SODA, Meadow Creek is unconfined, with a gradient less than 1 percent. The reach is composed of low-gradient riffle, step run, and pool habitat. The floodplain is active with oxbow cutoffs, side channels, and backwater features.

Stream Reach 3: EFSFSR Upstream of Meadow Creek

Headwaters EFSFSR

Upstream of the Meadow Creek confluence, the EFSFSR is characterized by narrower channels with moderate gradient (2 to 4 percent), transitioning to higher-gradient (4 to 8 percent) step-pool habitat further upstream. Overall substrate size is generally smaller than downstream reaches, with sand, gravel, smaller cobble, and boulders. This reach of the EFSFSR has relatively abundant riparian vegetation and large amounts of large woody debris.

Kuzis (1997) found that the Headwaters EFSFSR displays evidence of a high sediment load, such as streambed aggradation (deposition of material), channel splitting, pool filling, and overbank deposits of fines. The combination of low-gradient, relatively wide valley, plentiful wood supply, and a high sediment supply have resulted in current channel conditions. Kuzis (1997) suggested that much of the sediment found in the channel had been transported from Fern Creek, where the access road to the inactive Fern Creek Mine appears to be the source of much of the sediment.

Stream Reach 4: EFSFSR between Sugar Creek and Profile Creek

Stream Reach 4 is immediately downstream from Sugar Creek and is adjacent to the proposed mine site in the No Mans-EFSFSR subwatershed. The EFSFSR ranges from low-gradient habitat with pools to high gradient habitat with cascades. Substrate throughout the reach is variable, and dependent on the gradient, with the lower-gradient sections dominated by gravel and cobble, while the higher-gradient units are dominated by large cobble and boulders. Avalanches in 2014 have resulted in high concentrations of large woody debris in the EFSFSR downstream from Sugar Creek (MWH 2017). In April 2019, a series of avalanches and related landslides caused extensive damage to Stibnite Road (CR 50-412), and pushed snow, timber and other debris into the EFSFSR (Midas Gold 2019b).

Stream Reach 5: Headwaters EFSFSR Subwatershed

Stream Reach 5 represents the combination of Stream Reaches 1, 2, and 3 and, therefore, includes the entire 6th field subwatershed HUC 170602080201: Headwaters EFSFSR: Meadow Creek; EFMC; Garnet Creek; Fiddle Creek; Midnight Creek; and Hennessy Creek. This combined group of reaches was created to provide a subwatershed-scale analysis of streams on the proposed mine site.

Stream Reach 6: Sugar Creek

Stream Reach 6 includes the entire 6th field subwatershed HUC 170602080202: Sugar Creek. Sugar Creek, a tributary to the EFSFSR, enters the river downstream of the Yellow Pine pit lake. It has a relatively low-gradient. An officially closed, but still locally used, road closely parallels Sugar Creek for nearly 3.2 km before crossing the creek. This road may confine the movement of Sugar Creek, specifically in areas where the banks are bound with riprap rock material. Much of Sugar Creek has large aggregates of large woody debris. The dominant substrates are sand, gravel, and cobble.

This creek has widened channels, and excessive medial and lateral bar formation in response to past sediment inputs. In the 1940s, approximately 1 million cubic yards (approximately 76,455 cubic meters) of glacial overburden was removed from the EFSFSR channel, and placed in both Sugar Creek and other parts of the EFSFSR (Kuzis 1997).

Sugar Creek supports spawning and rearing for all four salmonid species, and represents one of the most productive fish habitats in the Upper EFSFSR watershed. Legacy mining-related impacts include construction of an access road adjacent to and in the stream channel, upstream sources of sediment, and mercury contamination.

Mine Site Watershed Condition Indicators

Baseline WCIs were determined for the six stream reaches within the proposed mine site (**Table 3.12-21**). Except for bull trout local population characteristics, more detailed baseline WCI tables are included in **Appendix J-1**.

Table 3.12-21 Mine Site Stream Reaches Baseline Summary of Watershed Condition Indicators

Watershed Condition Indicator	Stream Reach 1: EFSFSR and Tributaries from Sugar Creek to Meadow Creek	Stream Reach 2: Meadow Creek and EFMC	Stream Reach 3: EFSFSR upstream of Meadow Creek	Stream Reach 4: EFSFSR between Sugar Creek and Profile Creek	Stream Reach 5: Headwaters EFSFSR	Stream Reach 6: Sugar Creek
Bull Trout Local Population Characteristics within Core Area						
Local Population Size	FR	FR	FR	FR	FR	FR
Growth and Survival	FR	FR	FR	FR	FR	FR
Diversity and Isolation	FR	FR	FR	FR	FR	FR
Persistence and Genetic Integrity	FR	FR	FR	FR	FR	FR
Water Quality						
Temperature (steelhead/Chinook)	FR	FR	FR	FR	FR	FR
Temperature (bull trout)	FR	FR	FR	FR	FR	FR
Sediment/Turbidity (steelhead, Chinook)	FUR	FUR	FUR	FU	FUR	FU
Sediment/Turbidity (bull trout)	FUR	FUR	FUR	FUR	FUR	FUR
Chemical Contaminants	FUR	FR	FUR	FUR	FUR	FUR
Habitat Access						
Physical Barriers	FUR	FUR	FUR	FUR	FUR	FUR
Substrate Embeddedness (bull trout rearing areas)	FA	FA	FA	FA	FA	FA

Watershed Condition Indicator	Stream Reach 1: EFSFSR and Tributaries from Sugar Creek to Meadow Creek	Stream Reach 2: Meadow Creek and EFMC	Stream Reach 3: EFSFSR upstream of Meadow Creek	Stream Reach 4: EFSFSR between Sugar Creek and Profile Creek	Stream Reach 5: Headwaters EFSFSR	Stream Reach 6: Sugar Creek
Large Woody Debris	FA	FA	FA	FA	FA	FA
Pool Frequency and Quality	FUR	FR	FR	FA	FR	FR
Large Pools/Pool Quality (Bull Trout)	FUR	FUR	FUR	FUR	FUR	FUR
Off Channel Habitat	FR	FR	FR	FR	FR	FR
Refugia (steelhead/Chinook)	FR	FR	FR	FR	FR	FR
Refugia (bull trout)	FR	FR	FR	FR	FR	FR
Channel Conditions and Dynamics						
Average Wetted Width/Maximum Depth Ratio	FA	FA	FA	FA	FA	FA
Streambank Condition	FA	FA	FA	FA	FA	FA
Floodplain Connectivity	FR	FA	FR	FR	FR	FR
Flow/Hydrology						
Change in Peak/Base Flows	FA	FA	FA	FA	FA	FA
Change in Drainage Network	FA	FA	FA	FA	FA	FA
Watershed Condition						
Road Density/Location	FUR	FUR	FUR	FR	FUR	FUR
Disturbance History	FR	FR	FR	FUR	FR	FR

Watershed Condition Indicator	Stream Reach 1: EFSFSR and Tributaries from Sugar Creek to Meadow Creek	Stream Reach 2: Meadow Creek and EFMC	Stream Reach 3: EFSFSR upstream of Meadow Creek	Stream Reach 4: EFSFSR between Sugar Creek and Profile Creek	Stream Reach 5: Headwaters EFSFSR	Stream Reach 6: Sugar Creek
Riparian Conservation Areas	FA	FA	FA	FR	FA	FA
Disturbance Regime	FR	FR	FA	FR	FR	FR
Integration of Pathways						
Integration of Species/Habitat Conditions	FR	FR	FR	FR	FR	FR

Table Source: Rio ASE 2019a, except Reach 4, which is from Forest Service 2010b; IDEQ 2017; Kuzis 1997 and Burns et al. 2005; and Reach 6 which is from Kuzis 1997 and MWH 2017; Bull Trout Local Population Characteristics with Core Area which is from USFWS 2015a, and Integration of Species and Habitat which is derived from professional judgment

Table Notes:

FA = functioning appropriately; FR = functioning at risk; FUR = functioning at unacceptable risk

Mine Site Watershed Condition Indicators Described in Detail

Of the WCIs listed in **Table 3.12-21**, not all are equal in terms of evaluating the potential impacts of the proposed SGP within the proposed mine site (Section 4.12, Fish Resources and Fish Habitat – Environmental Consequences). Some baseline WCIs are of historical interest, some would not be affected by the proposed SGP, some are not well-established from a quantitative analysis perspective so they cannot be evaluated, and some WCIs are irrelevant to the proposed SGP. For these reasons, a small number (six) of WCIs that have the greatest potential to accurately identify potential impacts due to the SGP were selected for detailed analysis in Section 4.12. Baseline conditions for six WCI categories are described in greater detail here and carried forward for further analysis in Section 4.12. These six WCIs are:

1) Water Temperature;
2) Sediment/Turbidity;
3) Chemical Contaminants;
4) Physical Barriers;
5) Change in Peak/Base Flows; and
6) Integration of Species/Habitat Conditions.

A description of each of these WCIs and their current condition under baseline conditions is provided below. More detailed descriptions of these WCIsare provided in **Appendices J-1, J-2, J-3, J-5,** and **J-8**.

Water Temperature

Predicted future water temperatures resulting from the SGP were evaluated using a SPLNT model developed by Brown and Caldwell (2019c). This model evaluated the potential changes to stream water temperatures and Yellow Pine pit lake water temperatures that may occur as a result of proposed mining operations and subsequent reclamation. The SPLNT existing conditions model was developed and calibrated primarily using extensive site-specific meteorological, hydrologic, and stream data collected at the proposed mine site (Brown and Caldwell 2019c). The model uses widely accepted stream temperature and shading models and a general lake model applicable to mining and the model was developed to predict the following:

- Stream temperature changes that would occur during and after mining and reclamation activities; and
- Pit lake water temperature and dissolved oxygen profiles that would occur in the Hangar Flats and West End pit lakes after mining and reclamation.

The SPLNT model was developed using two separate software packages: QUAL2K for stream temperature modeling, and the General Lake Model for simulating pit lake temperatures. Results of the SPLNT model describing existing conditions (maximum weekly summer and fall temperatures) are shown in **Table 3.12-22** and **Figure 3.12-12**.

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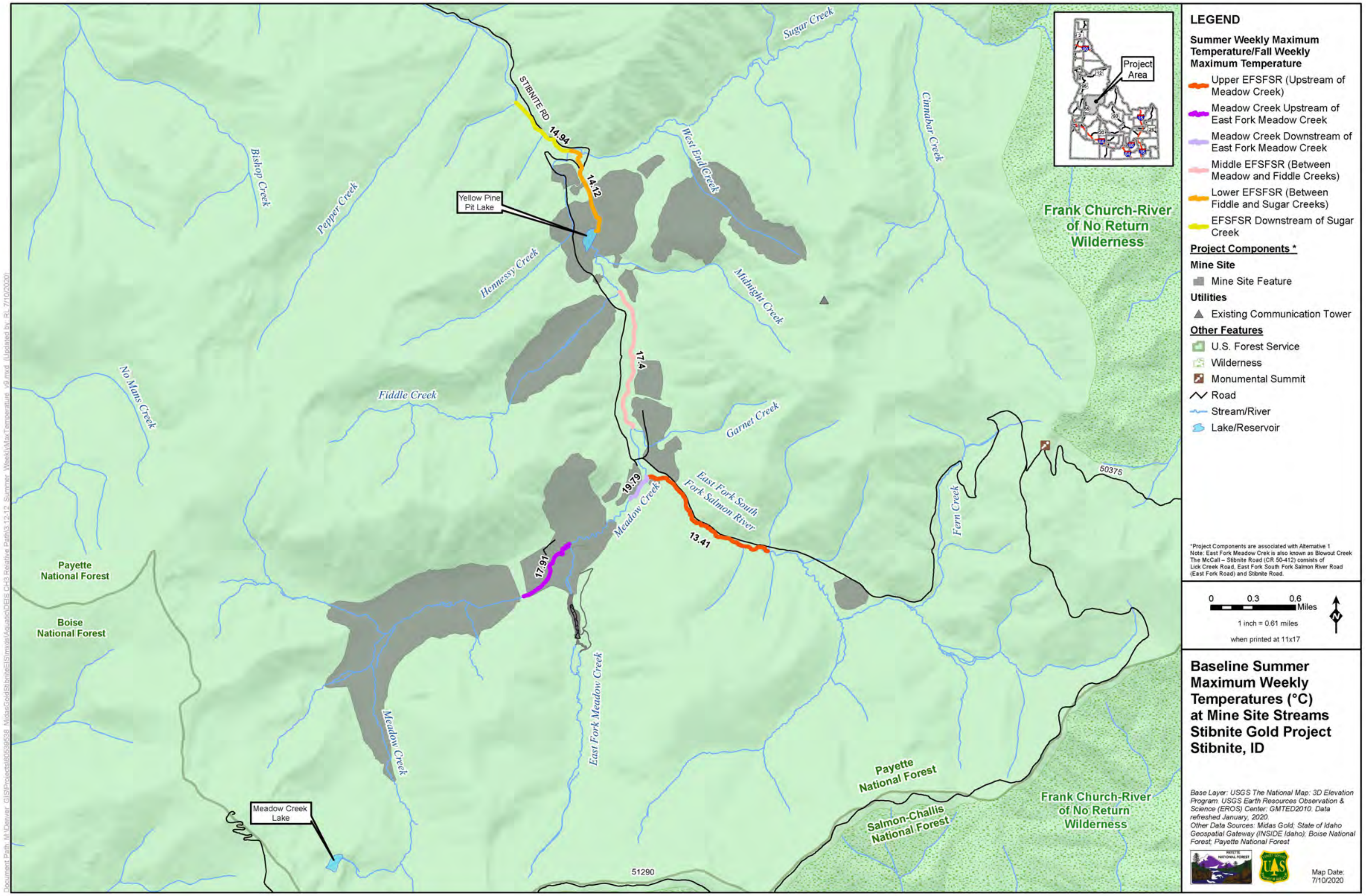

Figure Source: AECOM 2020

Figure 3.12-12 Baseline Summer Maximum Weekly Temperatures (°C) at Mine Site Streams

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Table 3.12-22 Baseline Maximum Weekly Summer Stream Temperatures for Specific Stream Reaches

SPLNT Model Stream Reach	Baseline Condition (°C)
Upper EFSFSR (immediately upstream of confluence with Meadow Creek)	13.4
Meadow Creek upstream of Confluence with East Fork Meadow Creek	17.9
Meadow Creek downstream of the Confluence with East Fork Meadow Creek	19.8
Middle EFSFSR (between Meadow and Fiddle creeks)	17.4
Lower EFSFSR (between Fiddle and Sugar creeks)	14.2
EFSFSR downstream of Sugar Creek	14.9

Table Source: Temperatures from Brown and Caldwell (2019b: Table C-19).

Table Notes:

Temperatures in degrees celcius (°C)

Establishing existing surface water temperature conditions at the proposed mine site was performed as part of the Surface Water Quality Baseline Study (HDR 2017) to provide a baseline dataset for comparing future temperature changes predicted by the SPLNT model. Existing surface water temperature conditions are discussed in Section 3.9.3.1.1.5, Water Quality, subsection Temperature.

The SPLNT model did not account for changes to stream temperatures caused by changing climate conditions. This means the model assumed future stream temperatures would be similar to the historic water temperature data without the SGP (Brown and Caldwell 2018a). Given ongoing climate changes, modeled temperature results would likely be higher if climate change had been considered in the model.

The NorWeST model, produced by the Forest Service Rocky Mountain Research Station, provides a variety of scenario-based parameters that represent future stream temperatures for National Hydrography Dataset (-Plus) reaches across the western U.S. The stream temperatures from the most downstream National Hydrography Dataset-Plus reach within each stream reach and the equivalent SPLNT reach water temperatures are presented in **Table 3.12-23**. NorWeST-modeled stream temperatures are presented (Isaak et al. 2016) alongside the SPLNT stream temperatures in **Table 3.12-23** and **Appendix J-2** to provide information regarding the possibility of changing climate conditions in the analysis area.

Of the NorWeST parameters, modeled stream temperatures for 1993-2011 and 2015 are the most appropriate for comparison to existing condition (baseline) SPLNT modeled stream temperatures because they most closely coincide with the data that was used to represent baseline conditions. The NorWeST data from the above timeframes most closely coincides with the baseline data, which was collected between 2012 and 2019. There are two parameters within the NorWeSt dataset that predict stream temperatures based on future scenarios; they are represented by warming trajectories 2040 (2030-2059) and 2080 (2070-2099). The exact year when the proposed SGP would be implemented is unknown; however, if construction were to begin in 2022, then Mine Year 20 would occur in 2045 (3 years construction plus 20 years of operation and closure and reclamation activities), within the NorWeSt 2040 (2030-2059) prediction timeframe. Year 112, would be outside of the predicted timeframes the NorWeSt models provide. These factors were considered when interpreting modeled future temperatures, especially the further into the future the modeled water temperatures represent.

Table 3.12-23 Comparison of Baseline SPLNT Model Temperatures with NorWeST Model Stream Temperatures for Multiple Timeframes

Stream Reach Number	Baseline SPLNT Model		NorWeST Model Stream Temperature (°C)			
	SPLNT Reach	Modeled Stream Temperature (°C)	1993-2011	2015	2030-2059	2070-2099
1	Yellow Pine pit lake Headwater	11.72	11.57	12.18	12.86	13.7
2	Meadow Creek	11.57	10.38	10.99	11.64	12.46
3	Upper EFSFSR at Rabbit Creek	9.24	9.95	10.56	11.2	12.01
4	SC7	10.64	10.83	11.43	12.1	12.92

Table Source: **Appendix J-2**. SPLNT model data from Brown and Caldwell 2018a

These modeling results indicate that, depending on stream reach, climate change would increase water temperatures from baseline estimates to the end of the mining operations (2030-2059) by as much as 0.1° to 2.0°C. Depending on the salmonid species, climate change may have important biological impacts that were not considered in the SPLNT modeling.The WCI criteria for water temperatures are species and life-stage-dependent (Rio Ase 2019a). The criteria also are defined as the 7-day average daily maximum water temperatures (7-ADMT). The WCI water temperature criteria for Chinook salmon and steelhead spawning and rearing, and bull trout spawning, incubation and rearing, used in the WCI functional assessment are included in BioAnalysts (2019; as cited in Rio ASE 2019a) and Forest Service (2003).

As shown in **Table 3.12-22** baseline water temperatures for Chinook salmon and steelhead are acceptable in Stream Reach 1 and for Chinook salmon in Stream Reach 3 (there are no steelhead in Stream Reach 3 due to the Yellow Pine pit lake barrier). Chinook salmon and steelhead are at risk in Stream Reaches 2, 4, and 6. In comparison, under baseline conditions bull trout are at risk or at unacceptable risk throughout the proposed mine site due to elevated water temperatures.

Sediment/Turbidity

All of the stream reaches in the Headwaters EFSFSR subwatershed are at unacceptable risk for Chinook salmon, steelhead, and bull trout due to baseline sediment conditions(**Table 3.12-21**). This is due to a variety of past disturbances at the proposed mine site that are currently affecting streambank stability and erosion, and the proximity to existing roads. The matrix WCIs use surface fines as a proxy to evaluate suspended sediment, turbidity, and salmonid spawning substrate quality.

Chemical Contaminants

This WCI is used to evaluate chemical contamination in surface waters in the analysis area at the proposed mine site. The description of existing conditions (and the impact analysis in Chapter 4) relies upon data collected at 10 surface water assessment nodes within the proposed mine site (**Figure 4.9-1**) and does not use the six Stream Reaches as defined above. Information to describe chemical contaminants in this section relies on information from Section 3.9.3, Surface Water and Groundwater Quality Existing Conditions, and chemical information was obtained at specific points within streams not within an entire stream reach. For a more detailed description of baseline water quality conditions see Section 3.9.3.

The description of chemical contaminants focuses on five constituents of concern: aluminum, copper, antimony, arsenic, and mercury. These five constituents of concern were selected because certain concentrations within the water or fish tissue can be detrimental to fish (potential effects to fish described in more detail below). **Table 3.12-24** provides the baseline conditions for these constituents of concern compared to the applicable criteria. Criteria were chosen based on consultation with the USFWS and NMFS. Explanations of the analysis criteria for the five constituents are provided in the table notes.

Aluminum

Aluminum can accumulate at the surface of the gill, leading to respiratory dysfunction and disruption of salt balance, and can cause mortality (EPA 2018). The aquatic life recommended criteria for aluminum for a site are based on site-specific conditions of pH, total hardness, and dissolved organic carbon. The EPA acute criteria for the same conditions as used in calculating the site-specific copper criteria based on the Biotic Ligand Model (Brown and Caldwell 2020b), range from 930 to 2,500 microgram per liter total recoverable aluminum, and the chronic criteria range from 360 to 1,700 microgram per liter total recoverable aluminum. The State of Idaho does not currently have a specific water quality standard for aluminum in place for the protection of aquatic life and the EPA criteria have not yet been adopted by the State of Idaho. Nevertheless they reflect the most current knowledge of potential impacts of aluminum to aquatic life.

None of the assessment nodes show an exceedance of the analysis criteria for aluminum.

Copper

Copper and copper compounds are acutely toxic to fish and other aquatic life at low parts per billion levels (Eisler 1991, 2000; Hamilton and Buhl 1990). Copper is essential to the growth and metabolism of fish and other aquatic life, but it can cause irreversible harm at levels slightly higher than those required for growth and reproduction (Eisler 2000). Exposure to sublethal levels of copper can have a detrimental effect on the behavior of salmonids. McIntyre et al.

(2012) evaluated the effects of copper exposure on juvenile Coho salmon (*Oncorhynchus kisutch*) predator avoidance behaviors and found that the exposed juveniles were unresponsive to their chemosensory environment, unprepared to evade nearby predators, and less likely to survive an attack sequence. Salmonids are known to avoid waters with sublethal concentrations of copper, and such concentrations alter other behavior as well.

Table 3.12-24 Average Measured Constituent Concentrations for Assessment Nodes

Constituent of Concern		Aluminum[1]	Copper[2]	Antimony[3]	Arsenic[4]	Mercury[5]
Analysis Criteria		0.38 mg/L	0.0024 mg/L	0.0056 mg/L	0.010 mg/L	2.0E-06 mg/L (total mercury)
Node	Stream	Average Measured Baseline (mg/L)				
YP-T-27	Meadow Creek	0.012	0.0003	0.0061	0.035	1.50E-06
YP-T-22	Meadow Creek	0.012	0.0003	0.0081	0.034	1.70E-06
YP-SR-10	EFSFSR	0.0094	0.0002	0.012	0.025	2.50E-06
YP-SR-8	EFSFSR	0.0094	0.0003	0.017	0.028	2.40E-06
YP-SR-6	EFSFSR	0.0098	0.0002	0.019	0.031	2.40E-06
YP-SR-4	EFSFSR	0.012	0.0003	0.031	0.063	2.40E-06
YP-SR-2	EFSFSR	0.014	0.0002	0.022	0.045	5.70E-06
YP-T-11	Fiddle Creek	0.016	0.0002	0.0006	0.002	1.80E-06
YP-T-6	West End Creek	0.004	0.0003	0.0105	0.08	4.20E-06
YP-T-1	Sugar Creek	0.009	0.0085[6]	0.034	0.013	0.159

Table Source: Midas Gold 2019a; SRK 2018

Table Notes:

1 Aluminum: Lowest predicted for the SGP area based on Recommended Aquatic Life Criteria (U.S. Environmental Protection Agency [EPA] 2018); The same water quality data as in the Biotic Ligand Model were used (Brown and Caldwell 2020b)

2 Copper criteria was derived using the Biotic Ligand Model per guidance contained in IDEQ (2017). A conservative chronic copper standard was estimated by applying the lowest of the 10th percentile chronic criteria based on regional classifications for the Salmon River Basin, Idaho Batholith, and third order streams. Per the SGP Water Quality Management Plan (Brown and Caldwell 2020c), preliminary calculations using the Biotic Ligand Model and site-specific data have produced similar values to the standard derived using these regional classifications.

3 Antimony does not have a specified NMFS or USFWS criteria and is based on EPA's human health chronic criterion for consumption of water and organisms is 0.0056 mg/L.

4 Arsenic: NMFS (2014) directed EPA to promulgate or approve new aquatic life criterion. In the interim, NMFS directed EPA to ensure the 0.010 mg/L human health criterion applied in all National Pollutant Discharge Elimination System permits. USFWS (2015b) directed EPA to ensure that the 10 microgram per liter recreational use standard is applied in all Water Quality Based Effluent Limitations (WQBELs) and Reasonable Potential to Exceed Calculations using the human health criteria and the current methodology for developing WQBELs to protect human health.

5 Mercury: NMFS (2014) directed EPA to promulgate or approve a new criterion. In the interim, implement the fish tissue criterion that IDEQ adopted in 2005. Where fish tissue is not readily available, then NMFS specified application of a 2.0E-06 mg/L threshold (as total mercury) in the interim. USFWS (2015b) directed EPA to use the 2001 EPA/2005 Idaho human health fish tissue criterion of 0.3 milligram per kilogram wet weight for WQBELs and reasonable potential to exceed criterion calculations using the current methodology for developing WQBELs to protect human health.

6 Of the 38 dissolved copper values reported for YP-T-1, only one value was higher than 0.00261 mg/L; therefore it is likely that this single anomalous value was the result of a sampling, analytical, or data management error.

mg/L = milligrams per liter

The Biotic Ligand Model-based copper criteria indicated an exceedance at YP-T-1. However, of the 38 dissolved copper values reported for YP-T-1, only one value was higher than 0.00261 mg/L; therefore it is likely that this single anomalous value was the result of a sampling, analytical, or data management error.

Antimony

Known effects of antimony on aquatic organisms are more limited than for other metals and most available information pre-date the last three decades. Antimony can be toxic to aquatic life and bioaccumulate in tissues but has not consistently shown a tendency to biomagnify within aquatic food webs as other metals (Obiakor et al. 2017). Ambient water quality criteria for the protection of aquatic life has not been established for antimony. Average antimony concentrations currently exceed the analysis criteria at every assessment node except YP-T-11 (**Table 3.12-24**).

Arsenic

Arsenic criteria are specific to the inorganic form, which is the more toxic form to aquatic life and humans. Arsenic exposure can occur through both waterborne concentrations and through dietary exposure for aquatic life and humans. In the state of Idaho, criteria exist for both the protection of human health and the protection of aquatic life. NMFS directed the human health standard be used until new aquatic life criterion can be promulgated by EPA. Arsenic can concentrate in tissues of fish, but it does not biomagnify. The effects of arsenic on fish health include enzymatic, genetic, and immune system failure (Kumari et al. 2017). Arsenic is a suspected carcinogen in fish and is associated with necrotic and fibrous tissues and cell damage, especially in the liver. Arsenic can result in immediate death through increased mucus production and suffocation. Other effects include anemia and gallbladder inflammation (NMFS 2014).

Arsenic concentrations currently exceed the analysis criteria at all assessment nodes except YP-T-11 (**Table 3.12-24**).

Mercury

Mercury in the environment originates from both natural and anthropogenic (human-caused) sources. However, regionally, the most significant source of mercury in Idaho is air deposition. Methylation is a process by which inorganic mercury is converted to the organic form (methylmercury), which can be present in the water column and is the form that bioaccumulates in tissues of living organisms. Consuming methylmercury that has accumulated in other organisms is the primary form for mercury exposure for humans. Currently, the value of 0.3 milligrams of methylmercury per kilogram of fish tissue wet weight is set at a level to protect the general public from negative effects of mercury during a lifetime of exposure through the consumption of fish. It also is the human health standard of 0.3 milligram per kilogram fish tissue criterion that is protective of aquatic life (IDEQ 2005, 2018). Although the water column-based aquatic life chronic criterion for mercury in Idaho is 0.000012 mg/L (Total), the preferred value used for interpreting risks of mercury contamination to aquatic life is the fish tissue criterion of 0.3 milligram per kilogram wet weight, the same value used for protection of human health (IDEQ 2018).

Predatory species in the food web concentrate the highest amounts of mercury in their tissues, a process called biomagnification. Fish in the streams and rivers of Idaho are the dominant predator species and can concentrate mercury at levels several times that of prey species, such as algae, aquatic insects, and fish that do not feed exclusively on other fish. Generally, piscivorous fish (fish-eating) will bioaccumulate the highest concentration of mercury. Larger fish, which also tend to be older, are expected to bioaccumulate the most methylmercury.

Mercury concentrations currently exceed the 2.0E-6 analysis criteria at six of the ten nodes including: YP-SR-10, YP-SR-8, YP-SR-6, YP-SR-4, YP-SR-2, and YP-T-6 (**Table 3.12-24**).

In sum, for the chemical contaminants WCI, the analysis area is “functioning at risk or unacceptable risk” at all ten nodes (**Table 3.12-21**) due to existing levels of legacy mining contamination. No stream on the proposed mine site is considered within acceptable risk levels for chemical contaminants. The constituents that are currently exceeding thresholds are arsenic, antimony, copper, and mercury.

Physical Barriers

Barriers to fish passage can impact the natural movement (i.e., migration) of fish species and fish population dynamics by reducing, or completely blocking, potential habitat during certain life stages. Barriers can impact fish habitat connectivity and disrupt the natural movement of fish and block important habitat for fish during all life cycles, including spawning and rearing. This section describes the existing barriers to natural fish movement and migration that exist at the proposed mine site. Fish passage barriers were identified and described at the proposed mine site in the Evaluation of Upper EFSFSR Fish Passage Barriers Technical Memorandum (BioAnalysts 2020). Only the EFSFSR downstream of the proposed mine site and Sugar Creek are without artificial (i.e., human-made) barriers (BioAnalysts 2020). Eleven artificial barriers to fish passage and one natural barrier were identified (BioAnalysts 2020). These barriers were identified as either complete, meaning no fish species can pass at any time of year, or partial, meaning some or all fish may pass at moderate or high flows, but not at low flows. Artificial barriers can be attributed to various actions, for example, construction of culverts and stream alteration (BioAnalysts 2020). These barriers are shown in **Figure 3.12-13** and described in more detail in **Appendix J-3**. **Table 3.12-25** presents the amount of total potential fish habitat upstream of each barrier.

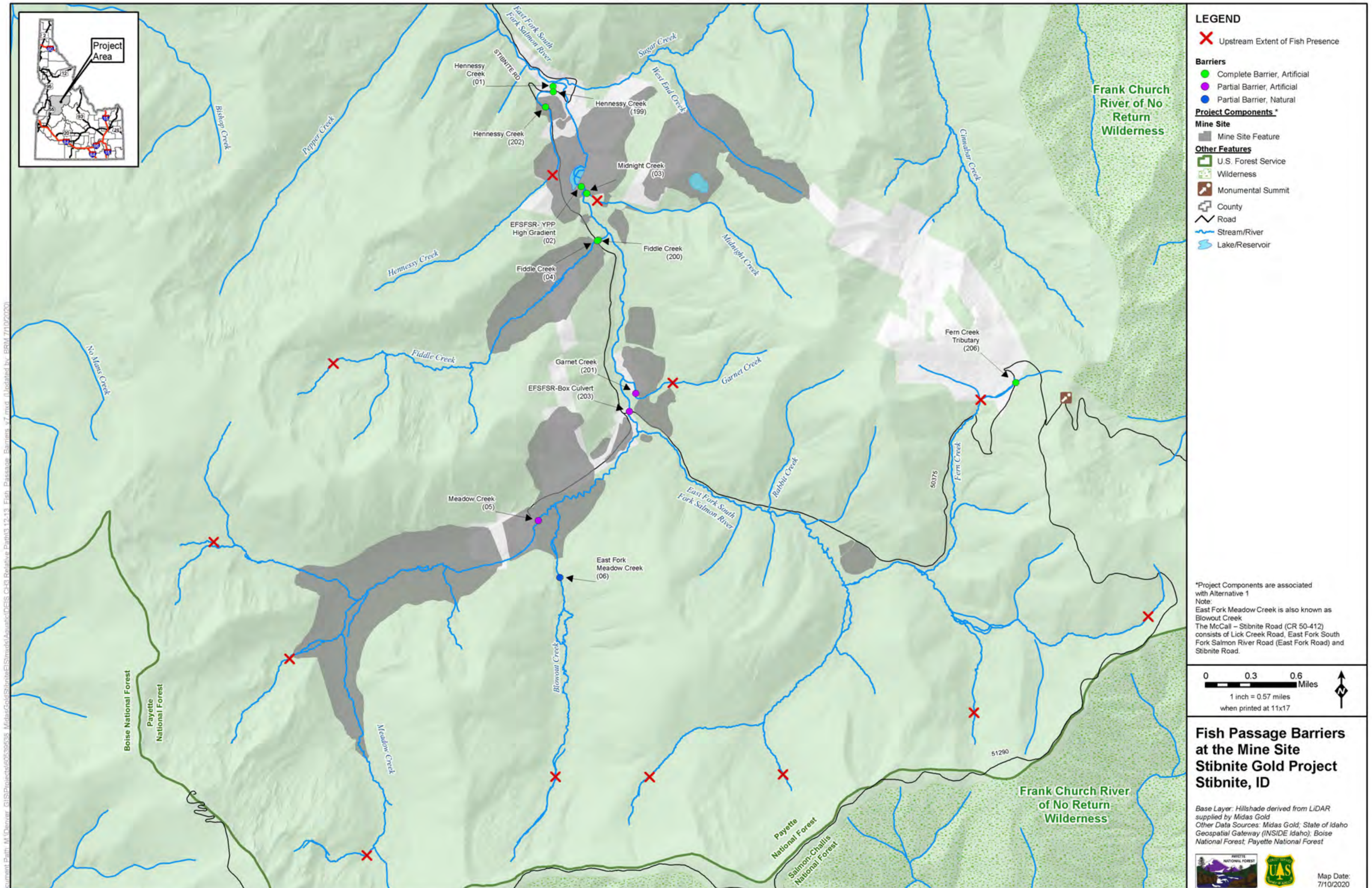

Figure Source: AECOM 2020

Figure 3.12-13 Fish Passage Barriers at the Mine Site

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Table 3.12-25 Existing Fish Passage Barriers at the Proposed Mine Site and Potential Habitat Upstream of the Barrier

Barrier	Type	Status	Potential Bull Trout and Cutthroat Trout Habitat[1] Upstream of Barrier (meters)	Potential Chinook Habitat[2] Upstream of Barrier (meters)	Potential Steelhead Habitat[2] Upstream of Barrier (meters)
EFSFSR - Yellow Pine Pit High Gradient (02)	Artificial	Complete	39,737	10,241	8,772
EFSFSR - Box Culvert (203)	Artificial	Partial	31,575	7,630	6,940
Hennessy Creek (01)	Artificial	Complete	1,048	0	0
Hennessy Creek (199)	Artificial	Complete	1,048	0	0
Hennessy Creek (202)	Artificial	Complete	1,048	0	0
Midnight Creek (03)	Artificial	Complete	0	0	0
Fiddle Creek (04)	Artificial	Complete	4,143	0	0
Fiddle Creek (200)	Artificial	Complete	4,143	0	0
Garnet Creek (201)	Artificial	Partial	518	0	0
Fern Creek Tributary (206)	Artificial	Complete	0	0	0
Meadow Creek (05)	Artificial	Partial	3,697	2,219	1,830
East Fork Meadow Creek (06)	Natural	Partial	2,398	0	0

Table Source: Barriers = BioAnalysts 2020, Potential Fish Habitat = **Appendix J-3**.

Table Notes:

1 As defined by the Occupancy Modeling (**Appendix J-7**) results which serve as “potential available fish habitat” for westslope cutthroat trout and bull trout.

2 As defined by the Intrinsic Potential Modeling (**Appendix J-4**) results which identifies potential useable habitat for steelhead trout and Chinook salmon.

BioAnalysts (2020) identified three major barriers to fish movement in the proposed mine site area: 1) EFSFSR upstream of the Yellow Pine pit lake high gradient; 2) EFSFSR box culvert; and 3) Meadow Creek. The EFSFSR upstream of the Yellow Pine pit lake is a high-gradient cascade, which is a complete barrier to natural fish passage upstream of the cascade. The other two major barriers, the EFSFSR box culvert and Meadow Creek barriers, are flow-dependent partial barriers that can block seasonal migration, and only hinder migration of fish that reside in or were stocked upstream of the Yellow Pine pit lake. There is a short (approximately 600 meters) segment of the EFSFSR downstream of the Yellow Pine pit that is accessible, and Chinook salmon were documented in redd surveys as spawning in this reach (Rabe et al. 2018). However, this WCI is currently “functioning at unacceptable risk” in the entire Headwater EFSFSR subwatershed.

Peak/Base Flows

USGS data were used to derive peak flow statistics for the ten major drainages in the analysis area. Results from the peak flow analysis were summarized in the baseline study (HydroGeo 2012) and are presented in Section 3.8.3.1.1.2, Baseline Monitoring Streamflow and Seep Data. Peak flows were calculated for the bottom of each drainage using the USGS StreamStats program. Predicted peak flows for a 1.5-year event ranged from 1.84 cubic feet per second (cfs) for West End Creek to 237 cfs for the EFSFSR, and for a 500-year event they ranged from 13.4 cfs to 931 cfs, respectively. **Table 3.8-5** in Section 3.8.3.1.1.2 provides the maximum flow predicted to occur for various return periods from a 1.5-year event up to a 500-year event.

Base streamflow data were collected in conjunction with surface water quality sampling on a monthly or quarterly basis at 32 non-USGS monitoring stations (**Figure 3.8-4**). The monitoring points were selected at upstream and downstream locations to bracket historical and potential future mining activities in the analysis area (Brown and Caldwell 2017). **Table 3.8-3** in Section 3.8.3.1.1.2 provides base streamflow statistics derived from baseline measurements collected between 2012 and early 2016. The average base flows calculated from this dataset for the EFSFSR ranged from 4.47 cfs at the farthest upstream monitoring location YP-SR-14, to 31.31 cfs at the most downstream location YP-SR-2.

Table 3.12-26 shows average monthly streamflows during the August to March low flow period at five gaging stations and one Stream Functional Assessment reach in the proposed mine site streams for the years 1929 to 2017 (see **Figure 3.12-14** for their locations).

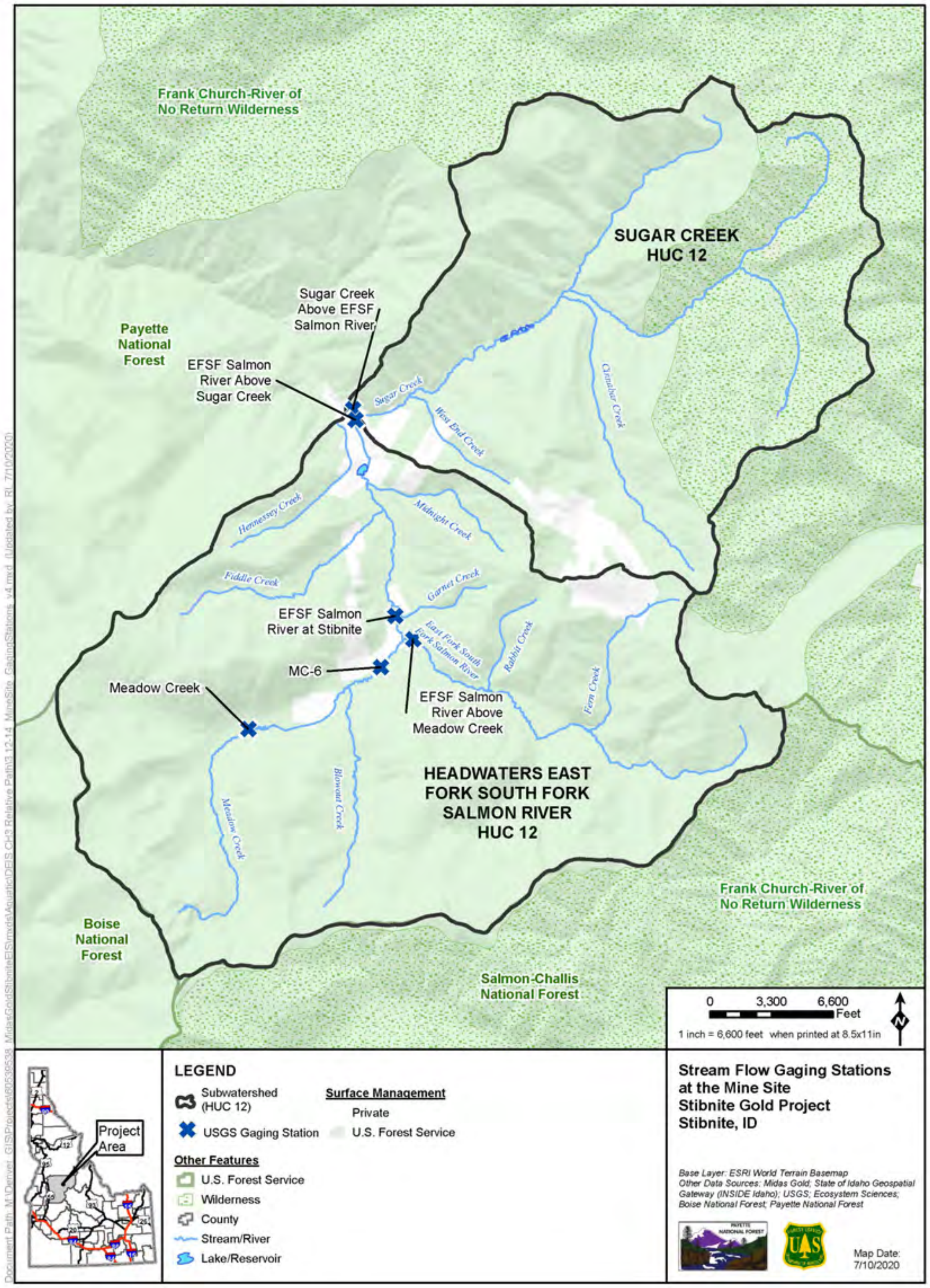

Figure Source: AECOM 2020

Figure 3.12-14 Stream Flow Gaging Stations at the Mine Site

Table 3.12-26 Average Monthly Streamflow During the August-March Low Flow Period for years 1929 to 2017 at USGS Gaging Stations and One SFA Reach (MC-6)

Month	EFSFSR above Meadow: gaging station 13310800 (cfs)	EFSFSR at Stibnite: 13311000 (cfs)	EFSFSR above Sugar Creek: 13311250 (cfs)	Sugar Creek above EFSFSR: 13311450 (cfs)	Meadow Creek: 13311850 (cfs)	Meadow Creek: MC-6 (cfs)
August	7.3	15.4	17.3	12.5	4.1	7.7
September	5.7	11.9	13.1	9.0	3.0	5.9
October	5.3	11.5	12.6	8.3	3.1	5.8
November	4.6	10.8	12.8	8.3	3.4	5.8
December	3.7	9.0	11.0	7.2	2.8	4.8
January	3.5	8.0	9.9	6.5	2.3	4.2
February	3.3	7.7	9.5	6.4	1.9	3.8
March	3.4	8.7	10.5	7.3	2.2	4.3
Average	**4.6**	**10.4**	**12.1**	**8.2**	**2.9**	**5.3**

Table Source: data from Rio-ASE spreadsheet: Modflow_Alternatives_Summary_08192019.xls

Table Notes:

EFSFSR = East Fork South Fork Salmon River.

SFA = Stream Functional Assessment.

cfs = cubic feet per second.

The WCI “Change in Peak/Base Flows” for all stream segments is “functioning acceptably” (**Table 3.12-21**).

Integration of Species/Habitat

This pathway is an integration of the biological, physical, and aquatic habitat conditions to determine the overall functional status of the subwatersheds from the perspective of different fish species. This WCI is scored based on professional judgment, consideration of specific WCIs that have a major influence on the overall condition, and the criteria listed in **Table 3.12-27**. All stream reaches at the mine site were scored as “functioning at risk” for this WCI for Chinook salmon, steelhead trout, and bull trout due to past and current disturbance (**Table 3.12-21**).

Table 3.12-27 Integration of Species and Habitat using Watershed Condition Indicators Criteria

Pathways and Watershed Condition Indicators	Functioning Appropriately	Functioning at Risk	Functioning at Unacceptable Risk
Integration of Species and Habitat (Bull Trout)	Habitat quality and connectivity among local populations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival and growth are consistent with pristine habitat. The local population has the resilience to recover from short-term disturbance within one to two generations (5 to 10 years). The local population is fluctuating around an equilibrium or is growing.	Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to pre-disturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The local population is reduced in size, but the reduction does not represent a long-term trend. The local population is stable or fluctuating in a downward trend. Connectivity among the local populations occurs but habitats are more fragmented.	Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will improve within two generations (5 to 10 years). Little or no connectivity remains among local populations. Local population survival and recruitment responds sharply to normal environmental events.
Integration of Species and Habitat (Steelhead, Chinook Salmon)	Habitat quality and connectivity among subpopulations is high. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival and growth are consistent with the desired conditions for the habitat. The subpopulation has the resilience to recover from short-term disturbance within one to two generations (5 to 10 years). The subpopulation is fluctuating around an equilibrium or is growing.	Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to pre-disturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. The subpopulation is stable or fluctuating in a downward trend.	Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will improve within two generations (5 to 10 years. Subpopulation survival and recruitment responds sharply to normal environmental events.

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3.13 Wildlife and Wildlife Habitat (Including Threatened, Endangered, Proposed, and Sensitive Species)

3.13.1 Introduction and Scope of Analysis

3.13.1.1 Introduction

This section describes the wildlife and wildlife habitats in the analysis area of the proposed Stibnite Gold Project (SGP) under existing (baseline) conditions. While all wildlife species are of management interest, three Threatened, Endangered, Proposed, or Candidate (TEPC) species under the Endangered Species Act (ESA) are either known to occur, or have the potential to occur, in the analysis areas: Canada lynx (*Lynx canadensis*) (threatened), Northern Idaho ground squirrel (NIDGS) (*Urocitellus brunneus*) (threatened), and wolverine (*Gulo gulo*)(proposed threatened). Aside from species with federal status, focal species, as defined in the Boise National Forest (BNF) Wildlife Conservation Strategy were selected from habitat families to represent environmental and ecological functions that may be affected by SGP activities. Included in this analysis are U.S. Forest Service (Forest Service) Region 4 Sensitive species which are designated by the Forest Service Regional Forester for specific regions or forests, BNF and Payette National Forest (PNF) Management Indicator Species (MIS), and Species of Greatest Conservation Need (SGCN) as identified in the BNF Wildlife Conservation Strategy (Forest Service 2010a).

The Idaho Partners in Flight (PIF) Idaho Bird Conservation Plan (Ritter 2000) was used to identify additional migratory bird species and habitats in the wildlife analysis area. Finally, existing conditions for several other non-special status wildlife species and big game species are included in this analysis, as they are known to occur, or have the potential to occur, in the analysis areas.

This section describes the biological environmental factors relevant to wildlife species and supporting habitats that have the potential to be affected by the SGP. Section 4.13, Environmental Consequences - Wildlife and Wildlife Habitat, evaluates the potential effects of the SGP.

3.13.1.2 Wildlife Analysis Area

Due to the size, scale, and complexity of the proposed SGP, several methods were used to define analysis areas for wildlife species. The wildlife analysis area for upland or riparian wildlife species (including Region 4 Sensitive or MIS), utilizes 6th-level Hydrologic Unit Codes (HUC) at the 12-digit scale (HUC 12) subwatershed boundaries (**Figure 3.13- 1** and **Table 3.13-1**). HUCs used in this analysis are local subwatershed levels that encompass tributary stream systems. Analysis areas also were developed for TEPC species (Section 3.13.1.2, Analysis Areas for

TEPC Species) based on peer-reviewed species-specific models. The wildlife analysis area is approximately 400,417 acres.

Table 3.13-1 HUC 12 Name and Acres in Wildlife Analysis Area

HUC 12 Name	HUC 12 Acres
Bear Creek-South Fork Salmon River	20,191
Beaver Creek	4,248
Boulder Creek	6,601
Burntlog Creek	25,180
Curtis Creek	17,476
Ditch Creek-Johnson Creek	16,046
Duck Creek-Cascade Reservoir	16,640
Goat Creek-South Fork Salmon River	17,709
Headwaters East Fork South Fork Salmon River	15,959
Headwaters Johnson Creek	23,418
Loosum Creek-East Fork South Fork Salmon River	16,175
Lower Big Creek	2,066
Lower Gold Fork River	538
Lunch Creek-Johnson Creek	15,414
No Mans Creek-East Fork South Fork Salmon River	19,654
Pearsol Creek-North Fork Payette River	1,934
Poison Creek-North Fork Payette River	7,085
Porcupine Creek-Johnson Creek	21,435
Profile Creek	12,457
Quartz Creek	12,273
Riordan Creek	14,257
Sheep Creek-Johnson Creek	10,403
Six-bit Creek-South Fork Salmon River	15,087
Sugar Creek	11,497
Tamarack Creek	11,708
Trapper Creek-Johnson Creek	12,422
Upper Big Creek	18,396
Upper Indian Creek	9
Upper Little Pistol Creek	23
Upper Monumental Creek	19,024
Warm Lake Creek	15,093
Total Acres (Analysis Area)	**400,417**

Table Source: Forest Service 2020

Table Notes:

Data gaps exist where portions of subwatersheds are outside of Forest Service administrative boundaries, and total HUC acreages are higher. Displayed acreages were used for SGP wildlife analysis.

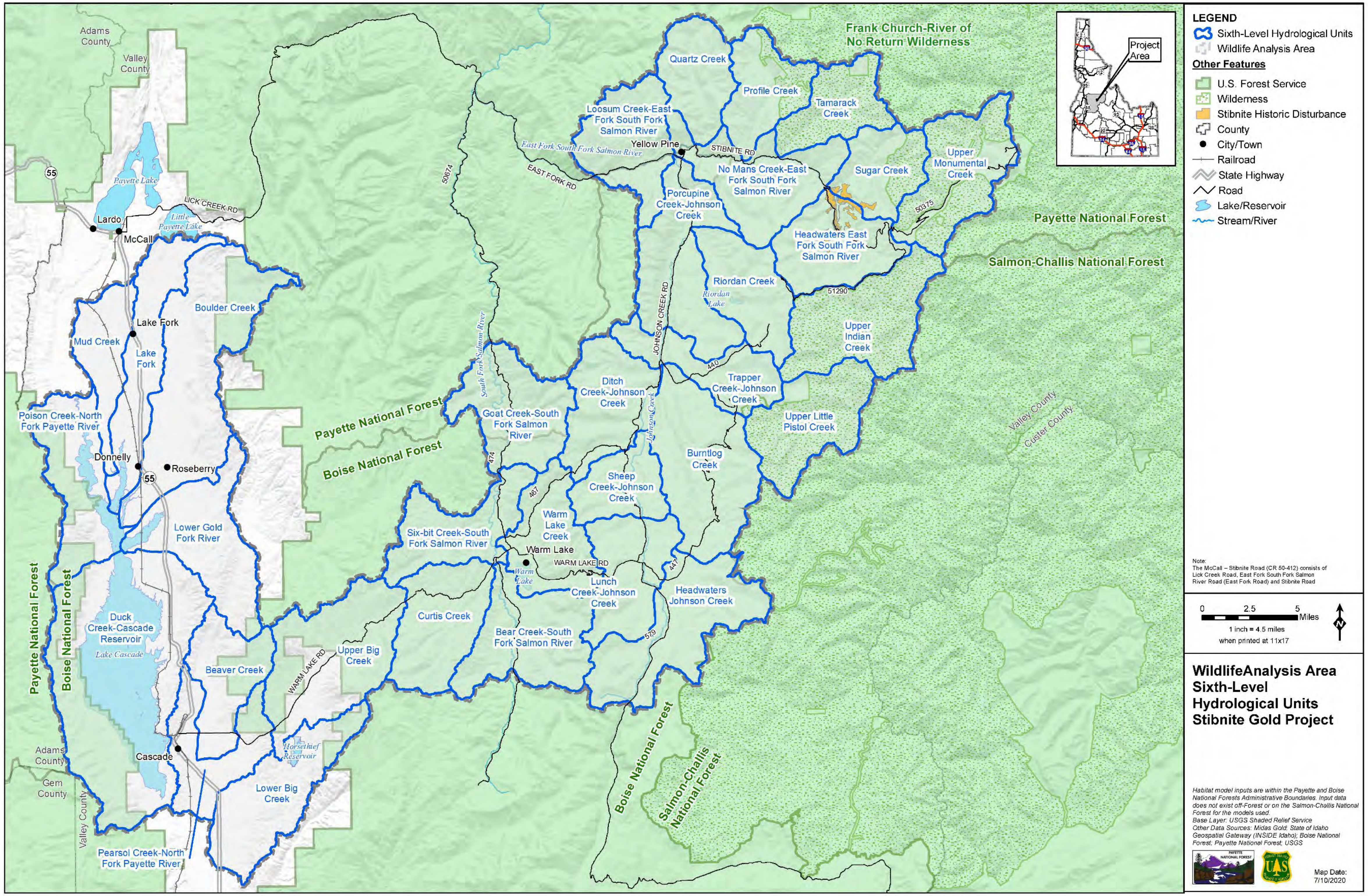

Figure Source: AECOM 2020

Figure 3.13-1 Wildlife Analysis Area Sixth-Level Hydrological Units

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3.13.1.3 Data Sources

Appendix A of the Payette National Forest Land and Resource Management Plan (Payette Forest Plan) (Forest Service 2003a) identifies desired conditions for tree size class, canopy cover class, species composition, snags, and coarse woody debris, using the historical range and variability (HRV) as the reference condition. These same components are used to predict changes in modeled source habitat for wildlife species at a landscape scale. SGP-related and site-specific data on patterns of habitat distribution and specific habitat features are used for the wildlife analysis. For many wildlife species, the complexity of habitat structure and association with other resources requires the addition of a fine-scale analysis at the qualitative level.

Existing habitat conditions for focal wildlife species were developed using habitat models originally designed for the 2003 Payette Forest Plan revision. These wildlife habitat models were recently updated for the PNF using the best available science, including information from models developed for the BNF Wildlife Conservation Strategy (Nutt et al. 2010), recent scientific literature, and PNF and BNF wildlife research data and survey reports. A summary of modeling parameters for existing source habitat for each species analyzed is documented in **Appendix K-2**, Modeling Parameters. The baseline data for this analysis were developed from the following data sources:

- Forest Service corporate database, Natural Resource Manager (NRM), Natural Resources Inventory System Wildlife.
- Idaho Department of Fish and Game (IDFG) database, Idaho Fish and Wildlife Information System.
- Surveys and survey reports prepared for the proposed SGP.
- Wildlife surveys conducted in different portions of the SGP area over the last decade, including peer-reviewed research.

3.13.1.4 Analysis Area Methodology

3.13.1.4.1 Habitat Families

The wildlife analysis areas are defined using forested and non-forested modeled source habitat or habitat elements (**Appendix K-3**, Life Histories). Existing source habitat for selected terrestrial wildlife species is described by habitat family (i.e., group). These groups fit into a hierarchical system of four broad habitat suites (i.e., sub-groups): 1) Forest Only; 2) Combination of Forest and Rangeland; 3) Rangeland Only; and 4) Riverine and Non-riverine Riparian and Wetland. These four suites are further refined by categorizing similar modeled source habitats into 14 Habitat Families: Families 1 through 4 are within Suite 1; Families 5 through 9 are within Suite 2; Families 10 through 12 are within Suite 3; and Families 13 and 14 are within Suite 4. Only some of these habitat families are included in this analysis due to the existing conditions present. Habitat families are a collection of species that share similarities in modeled source habitats, which are arranged along major vegetative themes, such as ecological communities, vegetative structure, and fire regime.

3.13.1.4.2 FOCAL SPECIES

Focal species were identified as being SGCN during the current planning period for PNF and BNF (e.g., next 10 to15 years) (IDFG 2017a). Those species were selected from habitat families to represent key environmental correlates and ecological functions that may be affected by SGP activities. Key environmental correlates are the biotic, or abiotic habitat elements that species use on the landscape to survive and reproduce. Key ecological functions are the set of ecological roles performed by a wildlife species in its ecosystem. These ecological roles are the primary ways organisms use, influence, and alter their environments.

Focal species are used in the analysis to address expected, or potential, changes to key ecosystem attributes. The focal species concept is described in more detail in the Interior Columbia Basin Ecosystem Management Project (Raphael et al. 2000; Wisdom et al. 2000). Species models and life history information were recently updated for 15 species. The following focal species were selected for analysis in this environmental impact statement (EIS):

- Family 1 (Low Elevation, Old Forest) – white-headed woodpecker (*Picoides albolarvatus*), Lewis's woodpecker (*Melanerpes lewis*);
- Family 2 (Broad Elevation, Old Forest) – American three-toed woodpecker (*Picoides tridactylus*), black-backed woodpecker (*Picoides arcticus*), boreal owl (*Aegolius funereus*), dusky grouse (summer habitats; *Dendragapus obscurus*), fisher (*Martes pennanti*), flammulated owl (*Otus flammeolus*), great gray owl (*Strix nebulosa*), northern goshawk (summer habitats; *Accipiter gentilis*), pileated woodpecker (*Dryocopus pileatus*), silver-haired bat (*Lasionycteris noctivagans*);
- Family 3 (Forest Mosaic) – Canada lynx, mountain quail (*Oreortyx pictus*), wolverine;
- Family 5 (Forest and Range Mosaic) – gray wolf (*Canis lupus*), peregrine falcon (*Falco peregrinus*), Rocky Mountain bighorn sheep (*Ovis canadensis*), Rocky Mountain elk (*Cervus canadensis*);
- Family 7 (Forests, Woodlands, and Sagebrush) – Townsend's big-eared bat (*Corynorhinus townsendii*);
- Family 12 (Grassland and Open-canopy Sagebrush) – NIDGS; and
- Family 13 (Riverine Riparian and Wetland) – bald eagle (*Haliaeetus leucocephalus*), Columbia spotted frog (*Rana luteiventris*).

Species modeling parameters and more detailed information is included in **Appendix K-2,** Modeling Parameters.

3.13.1.4.3 ASSUMPTIONS

The analysis incorporates the following assumptions:

- Unless there are species-specific surveys in the analysis areas to support presence or rarity of a species, the analysis assumes species presence when suitable habitat is present.
- The determination of habitat suitability is based on guidance and species habitat modeling in the Payette Forest Plan (Forest Service 2003a), the Boise National Forest Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2010b), and potential vegetation groups (PVGs), which are the best available habitat data that represents potential and climax vegetation communities. Quantifying available habitat using PVGs rather than existing vegetation is a conservative approach that ensures temporary vegetation changes (such as those caused by wildfires) do not affect the suitability of an area for specific wildlife species.

3.13.1.5 Analysis Areas for TEPC Species

3.13.1.5.1 CANADA LYNX ANALYSIS AREA

The Canada lynx analysis area includes the seven Lynx Analysis Units (LAUs) located within the wildlife analysis area. A LAU is a subdivision of a national forest, usually based on watersheds, that is used for the analysis and management of habitat for Canada lynx. LAUs were delineated across the PNF and BNF using fifth-level HUC boundaries, with some using sixth-level HUC boundaries, where applicable. See **Appendix K-1** for more information about LAUs. **Figure 3.13-2** shows the Canada lynx analysis area, which includes approximately 656,493 acres as defined by the seven LAUs (i.e., Stibnite, Yellowpine, Burntlog, Landmark, Warm Lake, East Mountain, and West Mountain). **Figure 3.13-2** also shows the current modeled source habitat for lynx in the Canada lynx analysis area.

3.13.1.5.2 NORTHERN IDAHO GROUND SQUIRREL ANALYSIS AREA

NIDGS have a very limited distribution and are only known to occur in three watersheds: Brownlee, Little Salmon, and Weiser. This is based on the habitat mapping resulting from the Crist and Nutt (2007) NIDGS model currently used by the PNF and BNF. **Figure 3.13-3** shows the NIDGS analysis area, which is approximately 17,917 acres and consists of modeled suitable habitat within the HUC12 wildlife analysis area. NIDGS are likely to only occur in specific habitats of the wildlife analysis area, and mostly in the western half of the wildlife analysis area. NIDGS are described in greater detail in Section 3.13.3.2.2.2, Northern Idaho Ground Squirrel Baseline. See **Appendix K-2** for more information about the habitat modeling used for NIDGS.

3.13.1.5.3 WOLVERINE ANALYSIS AREA

Wolverine habitat within the wolverine analysis area was modeled based on the persistent spring snow model (**Appendix K-2**), updated for the PNF and BNF (2009-2015) for the Wolverine – Winter Recreation Research Project: Investigating the Interactions Between Wolverines and Winter Recreation study (Heinemeyer et al. 2017), as described in Section 3.13.3.2.3.2, Wolverine Baseline. In the wildlife analysis area, wolverines are most likely to use habitats with persistent spring snow cover for winter range, including denning, and are expected to move through areas without snow at different times of the year. See **Appendix K-2** for more information about the habitat modeling used for wolverine. **Figure 3.13-4** shows the HUC 12 wildlife analysis area with modeled wolverine habitat (approximately 316,035 acres of persistent snow cover years 1 through 7).

3.13.1.6 Additional Wildlife Analysis Areas

If not discussed in this section, all other wildlife species were analyzed using the HUC 12 wildlife analysis area described in Section 3.13.1.

3.13.1.6.1 ROCKY MOUNTAIN BIGHORN SHEEP ANALYSIS AREA

The analysis area for Rocky Mountain bighorn sheep (bighorn sheep) is based on the habitat model developed to quantify summer and winter habitat on the PNF. The source habitat model for bighorn sheep used in the PNF's Bighorn Sheep Viability Final Supplemental EIS (Forest Service 2010c) was originally designed by the Hells Canyon Initiative.
Appendix K-2, Modeling, provides more information about the bighorn sheep source habitat model.

Based on known occupancy in the Frank Church-River of No Return Wilderness area (FCRNRW), the bighorn sheep analysis area also includes acreages in several HUC 12 watersheds on the Salmon-Challis National Forest (see **Figures 3.13-19** and **3.13-20**). More information regarding the PNF bighorn sheep model is available in PNF Bighorn Sheep Supplemental EIS Technical Report, Source Habitat Model (Forest Service 2010c) or **Appendix K-2**, Modeling.

3.13.1.6.2 RIPARIAN ANALYSIS AREA

The riparian analysis area includes any water/wetland features and forested riparian areas (forest types not categorized as PVGs) within the HUC 12 wildlife analysis area. The riparian analysis area was developed to describe existing conditions and potential impacts to the Columbia spotted frog and other associated riparian species. **Figure 3.13-5** shows the riparian analysis area, which is approximately 126,942 acres.

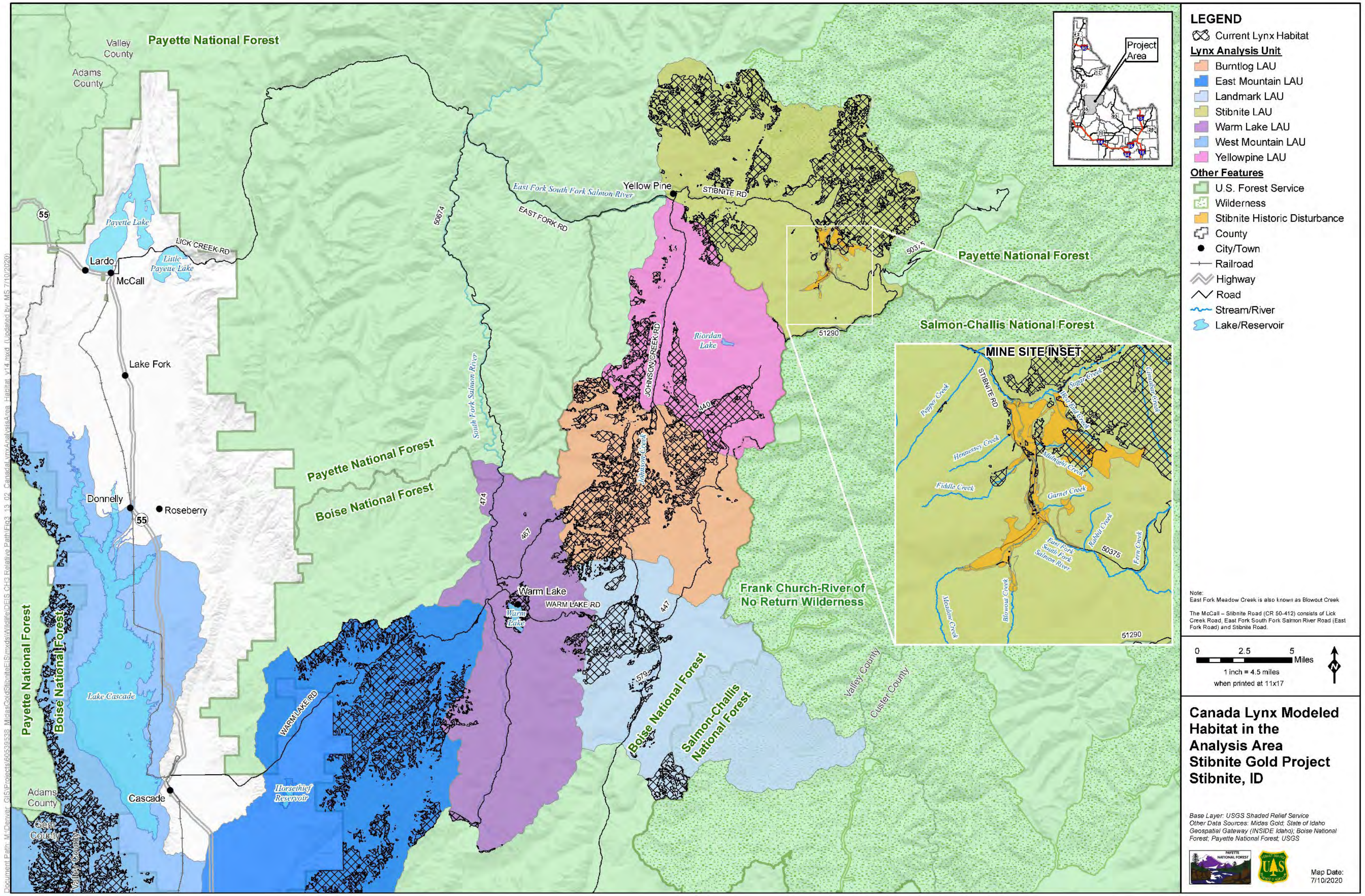

Figure Source: AECOM 2020

Figure 3.13-2 Canada Lynx Modeled Habitat in the Analysis Area

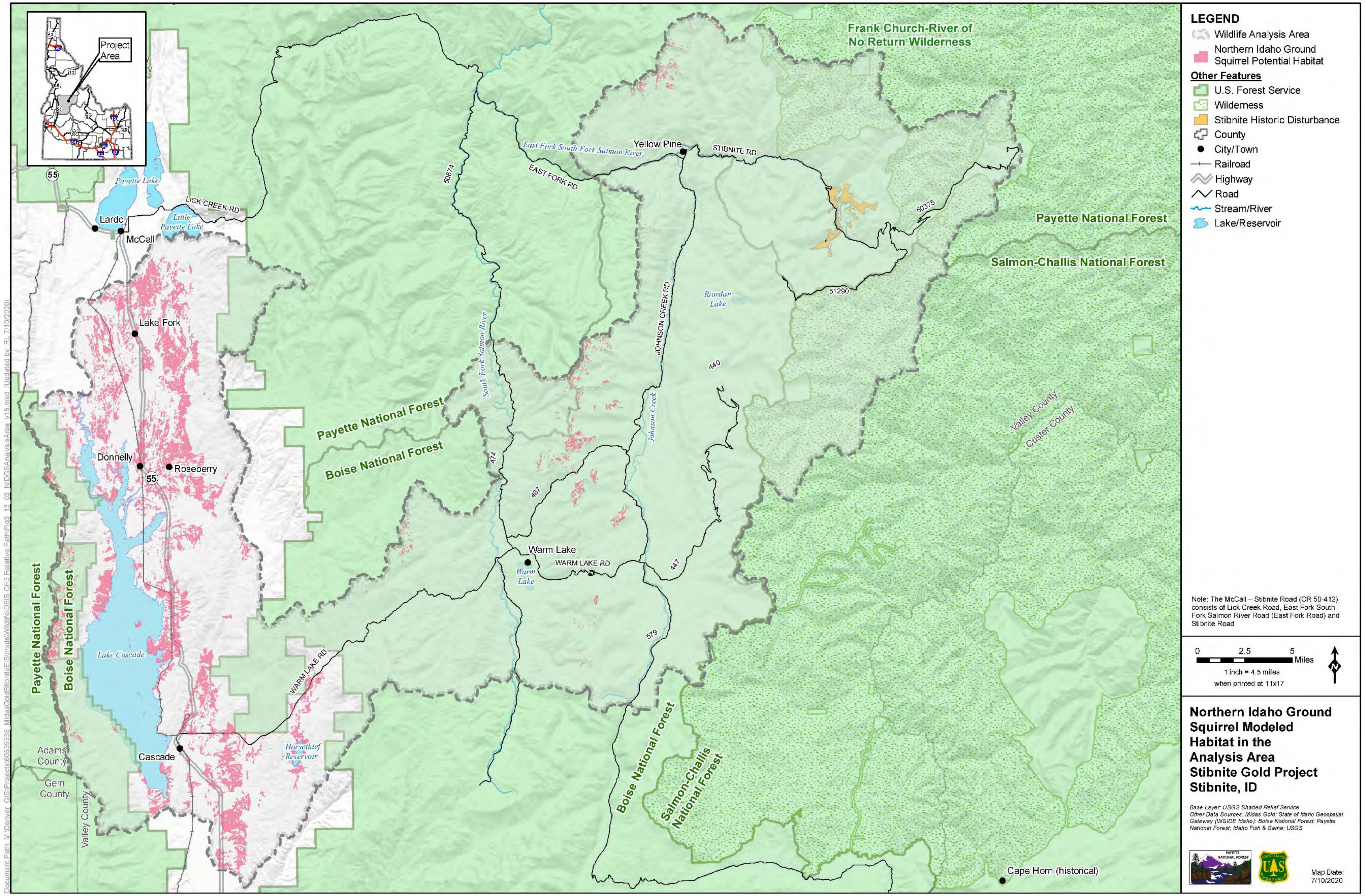

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-3 Northern Idaho Ground Squirrel Modeled Habitat in the Analysis Area

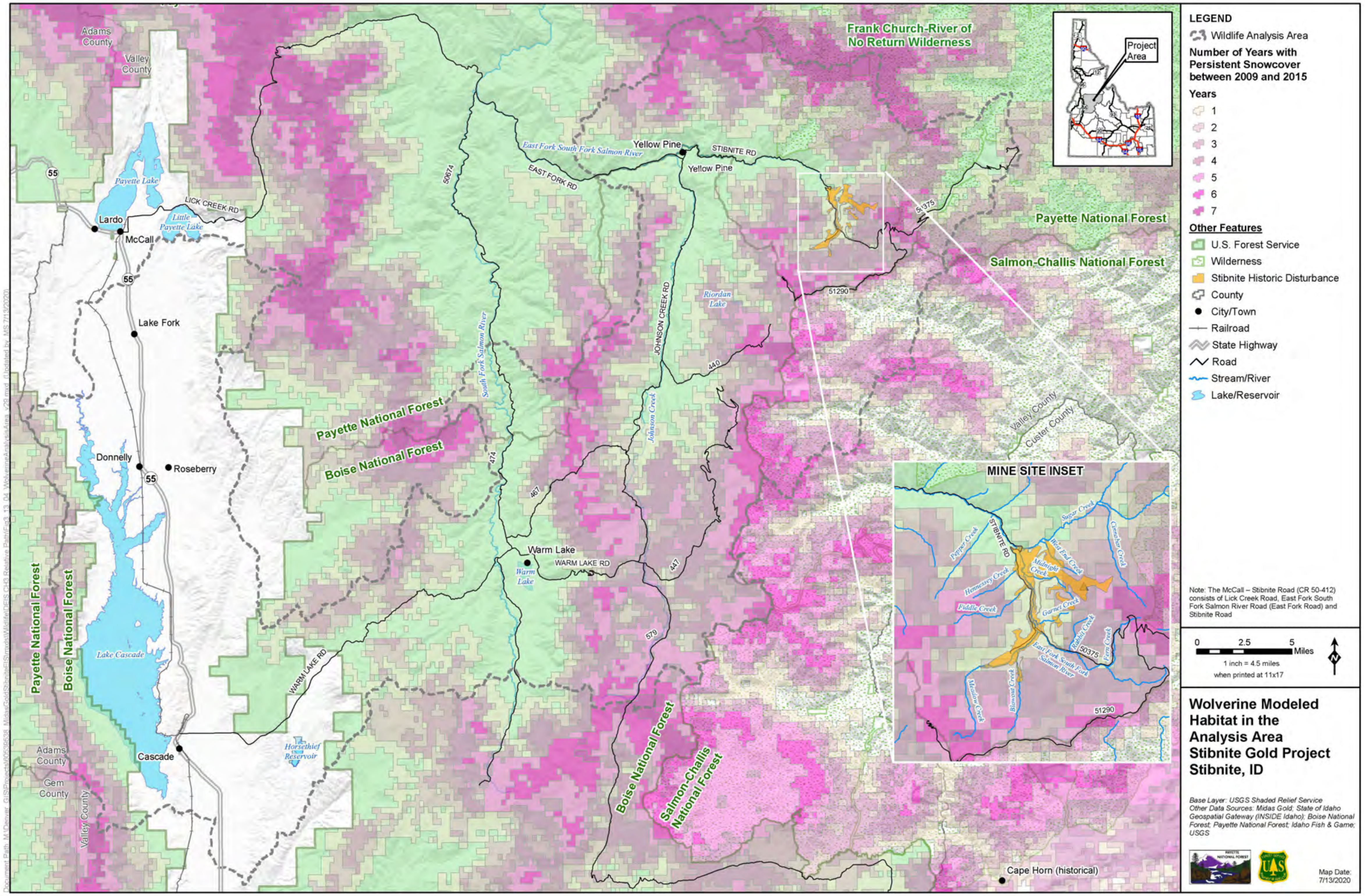

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-4 Wolverine Modeled Habitat in the Analysis Area

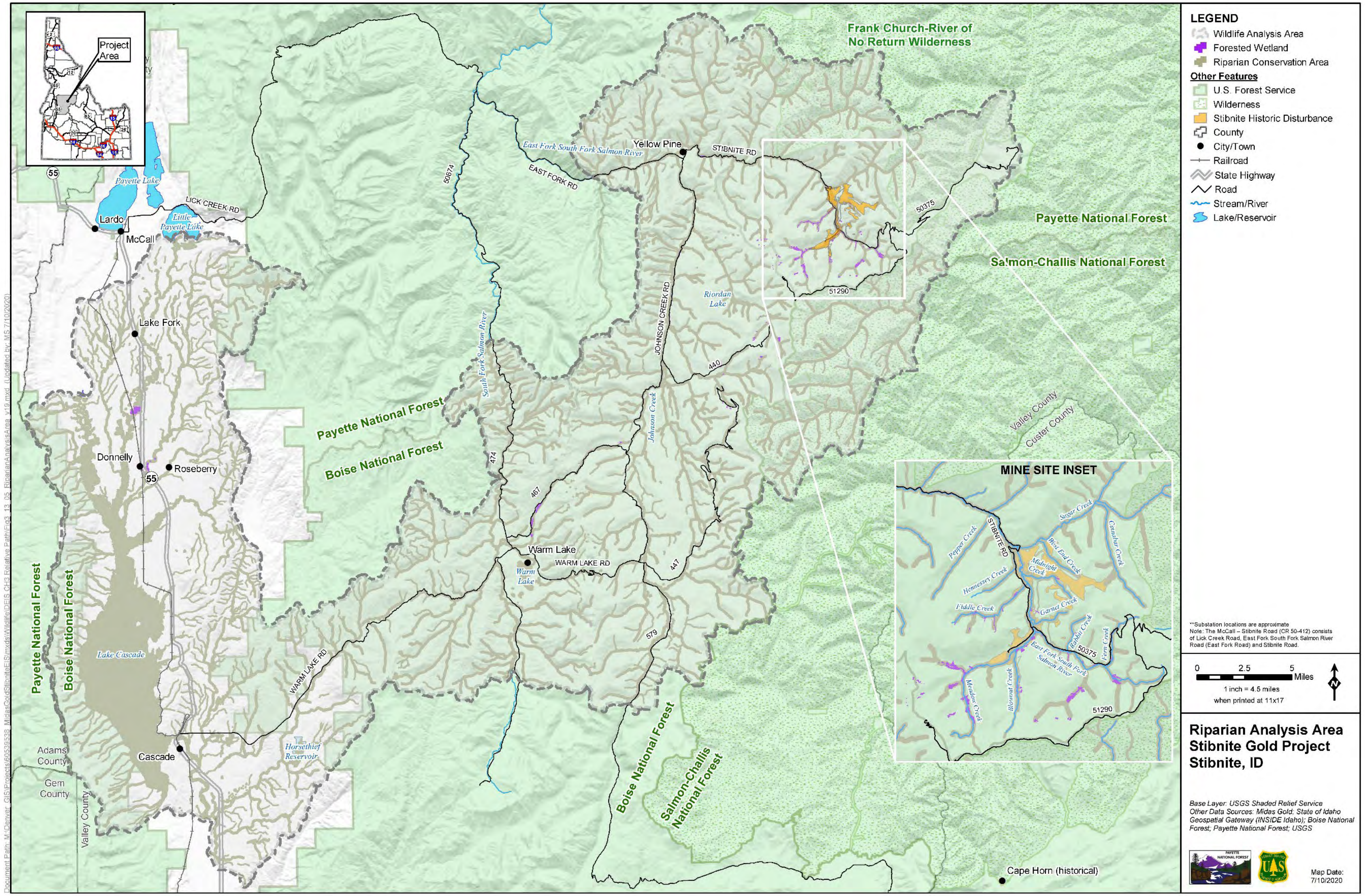

Figure Source: AECOM 2020

Figure 3.13-5 Riparian Analysis Area

3.13.2 Relevant Laws, Regulations, Policies, and Plans

3.13.2.1 Endangered Species Act

The ESA (16 United States Code [USC] 35 1531 et seq. 1988) provides for the protection and conservation of threatened and endangered species and their critical habitats.

Section 7 of the ESA (16 USC 35.1531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS or National Oceanic and Atmospheric Administration [NOAA] Fisheries), collectively known as “the Services”, which share regulatory authority for implementing the ESA. Federal agencies must submit a consultation package for proposed actions that may affect ESA-listed species, species proposed for listing, or designated critical habitat for such species. The USFWS generally manages ESA-listed terrestrial and freshwater plant and animal species. NOAA Fisheries is responsible for marine species, including anadromous fish when present in freshwater.

“Critical habitat” is defined by the ESA as specific areas within the geographical area occupied by listed species at the time of listing that contains the physical or biological features essential to conservation of the species and that may require special management considerations or protection, and specific areas outside the geographical area occupied by the species, if the agency determines that the outside area itself is essential for conservation (50 Code of Federal Regulations 424).

The first step of the overall consultation process is an “informal” consultation with one or both of the Services to determine if the proposed action is likely to affect any listed species, species proposed for listing, or designated critical habitat in the analysis area. The federal agency taking the action or the “action agency” (i.e., the Forest Service in the case of the proposed SGP) may prepare a Biological Assessment to aid in determining a project’s effects on listed or proposed species or designated critical habitat. If the action agency determines that the action is likely to adversely affect ESA-listed or proposed species or designated critical habitat, then the action agency enters into “formal” consultation. The USFWS and/or NOAA Fisheries prepare(s) a Biological Opinion; jointly or separately, if both Services are involved with the project) and determines whether the action is likely to jeopardize the continued existence of the species or adversely modify critical habitat. If there is an anticipated “incidental take” (i.e., “take”; see definition at 50 Code of Federal Regulations 402.02) of a species, one or both of the Services must issue an Incidental Take Statement that includes terms and conditions and reasonable and prudent measures that must be followed to eliminate or minimize impacts to the species or its critical habitat.

3.13.2.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703–712) provides protection for all migratory bird species. The MBTA specifically prohibits any action to “pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 USC 703). The list of migratory bird species protected by this law is based on bird families, and is periodically updated. The current list of migratory bird species can be found in 50 Code of Federal Regulations Part 10.13.

3.13.2.3 Executive Order 13186

Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds (66 Federal Register 3853; January 2001) directs federal agencies to protect migratory birds. The U.S. Department of Agriculture, Forest Service, and the USFWS signed a memorandum of understanding in December 2018 that outlines a collaborative approach to promote the conservation of migratory bird populations. The memorandum of understanding between the Forest Service and USFWS was designed to complement Executive Order 13186.

3.13.2.4 Opinion M-37050

On December 22, 2017 the Department of the Interior, Office of the Solicitor issued Opinion M-37050 concluding that the MBTA does not prohibit incidental take, and permanently withdraws and replaces Opinion M-37041 from January 2017, which concluded that the MBTA did prohibit incidental taking and killing.

3.13.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668-668d) provides protection for bald and golden eagles, including prohibition of interference with normal foraging, nesting, and rearing activities. This protection is separate from any ESA designation for either species. Additionally, the USFWS has developed the National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the provisions of the Bald and Golden Eagle Protection Act may apply to their activities.

3.13.2.6 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (Act of March 10, 1934), authorizes the Secretaries of Agriculture and Commerce to provide assistance to, and cooperate with, federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. Amendments enacted in 1946 require consultation with the USFWS and the fish and wildlife agencies of states where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

The amendments also re-titled the law as the USFWS Coordination Act and expanded the instances in which diversions or modifications to waterbodies would require consultation with the USFWS. These amendments permitted lands valuable to the Migratory Bird Management Program to be made available to the state agency exercising control over wildlife resources.

3.13.2.7 Executive Order 13443

Executive Order 13443 Facilitation of Hunting Heritage and Wildlife Conservation (72 Federal Register 46537, August 20, 2007), directs appropriate federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

3.13.2.8 State Regulations

Idaho Code (Title 36) establishes the Idaho Fish and Wildlife Commission and the IDFG. It establishes fish and wildlife as the property of the citizens of Idaho and gives authority to IDFG to protect, preserve, perpetuate, and manage the state’s fish and wildlife resources. The Commission has approved several fish and wildlife management plans that are relevant to the SGP. These include the Idaho Mule Deer Management Plan 2008-2017, the Idaho Elk Management Plan 2014-2024, the Management Plan for the Conservation of Wolverines in Idaho 2014-2019, and the Idaho State Wildlife Action Plan.

3.13.2.9 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for wildlife and wildlife habitat and include various objectives, guidelines, and standards for this purpose.

The Payette and Boise Forest Plans include management direction for wildlife and wildlife habitat, including TEPC species. The Forest Plans prescribe management direction in order to achieve the desired outcomes and conditions for wildlife and wildlife habitat. Both the Payette and Boise Forest Plans have numerous goals, objectives, guidelines, and standards related to special status and general wildlife species.

3.13.3 Existing Conditions

General descriptions of vegetation (i.e., wildlife habitat) in the wildlife analysis area, including descriptions of existing vegetation metrics used for analyses, are presented in Section 3.13.3.1, Vegetation Conditions Related to Wildlife Habitat.

The following subsections describe the existing conditions of TEPC species; focal species (including Region 4 Sensitive Species and MIS); Idaho SGCN; big game species; and migratory birds.

3.13.3.1 Vegetation Conditions Related to Wildlife Habitat

The Forest Service maps PVGs and existing vegetation on the PNF and BNF. These maps are updated periodically; the existing vegetation mapping was most recently updated in 2016 for the PNF and 2017 for the BNF, and PVG mapping was most recently updated in 2005 for the PNF and 2017 for the BNF (Forest Service 2005). This mapping is available only for National Forest System (NFS) lands.

Both existing vegetation and PVG mapping are useful to understand the vegetation community characteristics of a site, and as such, both datasets are referenced and used as the basis for describing existing conditions and analysis of impacts to wildlife habitat. Most focal species models applied in this analysis use a combination of PVG, canopy cover, and tree size class to define source habitat.

3.13.3.1.1 Potential Vegetation Groups

PVGs are generally a description of the climax plant community (final stage in ecological succession) that could be supported by a site, as determined by abiotic conditions such as climate, soil types, hydrological conditions, and topographical aspect. PVG descriptions derived from Payette and Boise Forest Plans (Forest Service 2003a, 2010b) are presented in **Table 3.10-2**, Forested PVGs in the Analysis Area; Section 3.10.3.1.1, Forested Potential Vegetation Groups in the Analysis Area Within Forest Service-Managed Land.

3.13.3.1.2 Existing Vegetation

The Vegetation Classification Mapping and Quantitative Inventory existing vegetation types (Forest Service 2016, 2017b) can be used to describe seral-stage (intermediate ecological succession) plant community composition as it was at the time of the most recent mapping. Existing vegetation mapping typically describes the current dominant vegetative cover or species occupying a site and is frequently updated to reflect vegetation changes due to disturbance such as fire, insects, and disease.

Vegetation communities in the region are generally coniferous forests typical of high mountain regions in Idaho and the inland northwestern U.S. The most common unburned existing vegetation types in the region are lodgepole pine forests, subalpine fir forests, Douglas-fir forests, ponderosa pine forests, and Engelmann spruce forests (Section 3.10.3.1.1, Forested Potential Vegetation Groups in the Analysis Area Within Forest Service-Managed Land). Fires routinely occur in the wildlife analysis area and surrounding forests, and as such, much of the wildlife analysis area and vicinity is mapped as burned herblands (grasses and forbs), burned sparse vegetation, and burned forest shrublands (**Appendix K-2**, Modeling Parameters).

Riparian habitats are present along numerous waterbodies, including the East Fork South Fork Salmon River, South Fork Salmon River, Rabbit Creek, Johnson Creek, Blowout Creek, Garnet Creek, Fiddle Creek, Midnight Creek, Hennessy Creek, West End Creek, Sugar Creek, and Meadow Creek. Existing vegetation types in the vegetation analysis area are shown in **Appendix H-2**, although the wildlife analysis area is much larger.

Existing vegetation mapping includes metrics on tree canopy cover classes and tree size classes, both of which are used to determine habitat suitability.

3.13.3.1.2.1 Tree Canopy Cover Class

The Forest Service tracks the canopy cover class (i.e., how dense the tree canopy is) of the various Vegetation Classification Mapping and Quantitative Inventory existing vegetation types (Forest Service 2016, 2017b), which can be further used to assess specific habitat preferences for terrestrial wildlife species. Because of past disturbance from mining activity and large wildfires, tree canopy closure is low across many portions of the wildlife analysis area.

3.13.3.1.2.2 Tree Size Classes

The Forest Service categorizes tree size classes (i.e., how large the trees are) of the various Vegetation Classification Mapping and Quantitative Inventory existing vegetation types (Forest Service 2016, 2017b), which can be further used to assess specific habitat preferences for terrestrial wildlife species. Tree size classes (measured in diameter at breast height [dbh]) in the wildlife analysis area also have been affected by past disturbance, including fire. A small percentage of the wildlife analysis area consists of large tree size classes (greater than 20 inches dbh). Small (5 to 10 inches dbh) and medium (10 to 20 inches dbh) tree size classes are more common throughout the wildlife analysis area. Sapling (0.1 to 5 inches dbh) and non-forested tree size classes are much less prevalent.

3.13.3.2 Threatened, Endangered, Proposed, and Candidate Species

Three TEPC species are either known to occur, or have the potential to occur, in the wildlife analysis area, and each has its own species-specific analysis area within the broader wildlife analysis area. These species are: Canada lynx, NIDGS, and wolverine (**Table 3.13-2**). The wolverine (proposed threatened by the federal government), and the NIDGS, which is listed as a threatened species under the ESA, are known to occur in the region. Although there is suitable habitat for the Canada lynx (federally listed threatened) in the Canada lynx analysis area, there have been no verified sightings since 1978.

An additional federal threatened species, the yellow-billed cuckoo (*Coccyzus americanus*), was considered but dismissed from this analysis. There are no documented occurrences or potentially suitable habitat for this species in the SGP area and vicinity (Strobilus Environmental 2017). Additionally, results of a query of the USFWS Information, Planning, and Conservation Online Database for the SGP area did not include this species (USFWS 2019).

Table 3.13-2 Focal Wildlife Species, including TEPC, Region 4 Sensitive, and Management Indicator Species, and Habitat Considered for Analysis

Suite	Habitat Family	Focal Species Considered in this Analysis	Scientific Name	Species Status [1]	Occurrence in the Analysis Area
Forest Only	1—Low Elevation, Old Forest	White-headed Woodpecker	*Picoides albolarvatus*	S/MIS	R4 Sensitive species, PNF/BNF MIS, selected focal species. Limited source habitat and occurrence in analysis area.
		Lewis's Woodpecker	*Melanerpes lewis*	S	R4 Sensitive species, selected focal species. Limited source habitat and occurrence in analysis area.
	2—Broad Elevation, Old Forest	American Three-toed Woodpecker	*Picoides tridactylus*	S	R4 Sensitive species, selected focal species. Dependent mostly on disturbance events, such as fire or insect infestation. Species documented and source habitat in analysis area.
		Black-backed Woodpecker	*Picoides arcticus*	S/MIS	R4 Sensitive species, BNF MIS, selected focal species. Species documented and source habitat in analysis area.
		Boreal Owl	*Aegolius funereus*	S	R4 Sensitive species, selected focal species. Species documented and source habitat occurs, mostly at higher elevations, in analysis area.
		Dusky Grouse (summer)	*Dendragapus obscurus*	F	Selected focal species. Species documented and source habitat in analysis area.
		Fisher	*Martes pennanti*	S	R4 Sensitive species, selected focal species. Species documented and source habitat in analysis area.
		Flammulated Owl	*Otus flammeolus*	S	R4 Sensitive species, selected focal species (summer habitat). Species documented and source habitat in analysis area.
		Great Gray Owl	*Strix nebulosa*	S	R4 Sensitive species, selected focal species. Species documented and source habitat in analysis area.
		Northern Goshawk (summer)	*Accipiter gentilis*	S	R4 Sensitive species, selected focal species. Species documented and source habitat in analysis area.
		Pileated Woodpecker	*Dryocopus pileatus*	MIS	PNF/BNF MIS, selected focal species. Species documented and source habitat in analysis area.
		Silver-haired bat	*Lasionycteris noctivagans*	F	Selected focal species. Species documented and source habitat in analysis area.
	3—Forest Mosaic	Canada Lynx	*Lynx canadensis*	T	TEPC species, selected focal species. Rare. Modeled source habitat in analysis area.
		Mountain Quail	*Oreortyx pictus*	S	R4 Sensitive species, selected focal species. Source habitat in analysis area, rare species occurrence.
		Wolverine	*Gulo gulo*	PT	TEPC species, selected focal species. Species documented and high quality habitat in analysis area. Potential denning habitat (i.e., high elevation cirques, talus slopes, and forests) present.

Suite	Habitat Family	Focal Species Considered in this Analysis	Scientific Name	Species Status [1]	Occurrence in the Analysis Area
Combination of Forest & Rangeland	5—Forest & Range Mosaic	Gray Wolf	*Canis lupus*	S	R4 Sensitive species, selected focal species. Species (known packs) documented and habitat in analysis area.
		Peregrine Falcon	*Falco peregrinus*	S	R4 Sensitive species, selected focal species. Species documented and known habitat, including nesting sites on the BNF, within analysis area.
		Rocky Mountain Bighorn Sheep	*Ovis canadensis*	S/BG	R4 Sensitive species, selected focal species. Species documented (known herds in FCRNRWA) and winter and summer habitat in analysis area.
		Rocky Mountain Elk	*Cervus canadensis*	BG	PNF Species of Special Interest, Idaho IDFG species of concern, selected focal species. Source habitat present throughout analysis area.
	7—Forests, Woodlands, & Sagebrush (Not addressed in the analysis)	Spotted Bat (Species not analyzed in EIS)	*Euderma maculatum*	S	R4 Sensitive species. Some suitable habitat in analysis area, but not expected to occur. Rare.
		Townsend's Big-eared Bat	*Corynorhinus townsendii*	S	R4 Sensitive species, selected focal species. Species documented and suitable habitat in analysis area.
		Northern Idaho Ground Squirrel	*Urocitellus brunneus*	T	TEPC species, selected focal species. Modeled source habitat in analysis area. Historical occurrence.
Riverine & Non-riverine Riparian & Wetland	13—Riverine Riparian & Wetland(Not addressed in the analysis)	Bald Eagle	*Haliaeetus leucocephalus*	S	R4 Sensitive species, selected focal species. Species documented and known habitat, including nesting sites, within analysis area.
		Columbia Spotted Frog	*Rana luteiventris*	S	R4 Sensitive species, selected focal species. Source habitat occurs in riparian & wetland areas. Species documented and source habitat in analysis area.
		Harlequin Duck (Species not analyzed in EIS)	*Histrionicus histrionicus*	S	Source habitat present in some low-gradient sections of analysis area. Rare. No known observations in analysis area.
		Yellow-billed Cuckoo (Species not analyzed in EIS)	*Coccyzus americanus*	T	Analysis area outside of USFWS modeled habitat and known occurrence.

Table Source: Forest Service 2020

Table Notes:

1 Species Status (USFWS 2019): T = ESA Threatened; C = ESA Candidate; P = ESA Proposed; S = Region 4 Sensitive; MIS = PNF and BNF Management Indicator Species, F = Focal Species, BG = Big Game, R4 = Region 4

3.13.3.2.1 CANADA LYNX

3.13.3.2.1.1 Species Status

The Final Rule to list the Canada lynx as threatened under ESA by the USFWS was issued in March 2000 (65 Federal Register 16052). In 2000, the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000) was developed to provide a consistent and effective approach to conserve Canada lynx on federal lands. The PNF and BNF amended their existing plans in 2003 to be consistent with the LCAS.

Critical habitat for lynx was designated by the USFWS on February 25, 2009 (74 Federal Register 8616) and revised on September 12, 2014 (79 Federal Register 54781). Critical habitat for Canada lynx has been designated by the USFWS in five core units: Unit 1 in Maine, Unit 2 in Minnesota, Unit 3 in Montana and Idaho, Unit 4 in Washington, and Unit 5 in Wyoming and Montana (74 Federal Register 36 8673). The Idaho portion of Unit 3 is located outside the Canada lynx analysis area for the SGP in the extreme eastern border of Boundary County in the northern “panhandle” region of the state, approximately 280 miles away. No critical habitat has been designated in the PNF or BNF and core, secondary, and peripheral areas delineated for the Recovery Outline for the Contiguous U.S. Distinct Population Segment of Canada Lynx describe the forests as a secondary area (USFWS 2005). The LCAS updated in 2013 (Interagency Lynx Biology Team 2013) also describes the PNF and BNF as secondary areas. Secondary areas are those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and/or reproduction. It has been hypothesized that secondary areas may contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, allowing animals to then return to core areas (USFWS 2005).

3.13.3.2.1.2 Baseline

Canada lynx are medium-sized cats (13 to 31 pounds) with noticeably large feet, long legs, and a ruffed face with ear tufts. They occur throughout Canada and Alaska, in the northern and central Rocky Mountains, and in the extreme northeastern and north-central U.S. Most lynx occurrences in the western U.S. are associated with mixed-conifer forest with the highest percentage (77 percent) occurring at the 4,921- to 6,562-foot elevation zone (McKelvey et al. 2000). Subalpine fir, Engelmann spruce, and lodgepole pine forest cover types in cold, moist PVGs provide the predominant habitat type for lynx (Aubry et al. 2000). Dry forest cover types, such as ponderosa pine forest, are not expected to provide lynx habitat. Typical prey species include snowshoe hares, squirrel species, grouse species, porcupines, beaver, small rodents, and even deer species opportunistically (Interagency Lynx Biology Team 2013). However, because snowshoe hare are the primary prey of lynx throughout their range, lynx distribution is closely associated with snowshoe hare distribution. Enhancing and protecting snowshoe hare habitat is a management priority in secondary areas (Interagency Lynx Biology Team 2013). Canada lynx typically use boreal forest landscapes with a mosaic of successional forest types that contain the following features (USFWS 2009):

- Presence of snowshoe hare and their preferred habitat conditions, which include dense understories of young trees, shrubs, or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface.
- Winter snow conditions that are generally deep and fluffy for extended periods of time.
- Sites for denning that have abundant, coarse, woody debris, such as downed trees and root wads.
- Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) that lynx are likely to travel through while accessing patches of boreal forest in a home range.

Canada lynx habitat was mapped on the PNF and BNF and relies on specific habitat types in specific structural stages within certain PVGs, which is unlike other species models that only use PVGs with structural conditions (e.g., tree size class and canopy cover). The PNF and BNF use two classifications for lynx habitat in LAUs: “existing suitable habitat” and “source habitat capacity.” “Existing suitable habitat” meets forest criteria that is currently suitable for use by lynx and is defined by parameters such as post-burn habitat (defined to better represent horizontal cover in snowshoe hare habitat), road density, and plantation age. Current habitat modeling parameters are based on previously defined relationships among vegetation, snowshoe hare, and lynx. “Source habitat capacity” has the potential to develop into suitable lynx habitat in the future. The source habitat capacity model predicts the potential for overall lynx habitat capacity, including primary (breeding) and secondary habitat. It defines acreages of vegetative communities (in selected PVGs), which include preferred habitat types such as Engelmann spruce, lodgepole pine, and mixed-conifer types with Douglas fir and subalpine fir. However, the lynx habitat models are limited by inadequate data for various habitat features (e.g., tree size class, tree canopy cover, dead and downed wood, snag density, and understory cover), and overestimate current and source habitat acreages as a result. The PNF and BNF maintain the lynx habitat classes as a spatial database for analysis using Geographic Information Systems. **Table 3.13-3** summarizes the areas of existing and unsuitable lynx habitat in each LAU, and whether the LAU currently meets the Forest standard for suitable habitat.

There are approximately 102,147 acres of existing suitable habitat for Canada lynx in the PNF and BNF LAUs listed above (i.e., Canada lynx analysis area), and 220,260 acres of source habitat capacity (i.e., extent of PVGs or cover types capable of developing source habitat conditions at some point in time and within some defined area [Forest Service 2003a, 2010b]) for the PNF and BNF LAUs. **Figure 3.13-2** shows the current habitat for Canada lynx. Five of the seven LAUs are currently not meeting Forest TEPC Standard 15 (TEST15); this indicates the percentage of unsuitable habitat in the LAUs is higher than the 30 percent threshold. Wildfires account for the majority of unsuitable habitat in these LAUs (Forest Service 2018). Current and historic status of lynx in Idaho and the latest scientific literature predict rare occurrence of lynx in the PNF and BNF. In Idaho, the total population number is unknown, but is expected to be low based on the studies discussed below and in **Appendix K-1**. Surveys conducted in 2007 using the National Lynx Protocol detected lynx in the BNF but not the PNF.

The National Lynx Detection Survey was conducted from 1999 to 2003 in forests with potential to have lynx, including the BNF. A survey grid was established in the Cascade Ranger District in the Burntlog and Yellowpine LAUs from 2001 to 2003. No lynx were detected during those efforts (Forest Service 2018).

Table 3.13-3 Lynx Habitat Acreage by Lynx Analysis Unit in the Canada Lynx Analysis Area

LAU	Total LAU Acreage (Acreage Within Analysis Area)	Existing Suitable Habitat	% of Unsuitable Habitat	Currently Meets Standard TEST15 (<30% Unsuitable)
Stibnite	81,895	23,880	39.8	No
Yellowpine	48,074	9,107	70.5	No
Burntlog	51,857	15,507	55.0	No
Warm Lake	67,282	1,887	94.1	No
Landmark	44,494	7,560	78.5	No
East Mountain	109,445	25,254	12.4	Yes
West Mountain	95,838	18,953	1.5	Yes
Total	**498,885 [1]**	**102,147**	**N/A**	**N/A**

Table Source: Forest Service 2018

Table Notes:

1 Acreage based only on NFS lands. Canada lynx analysis area (656,493 acres) includes NFS and non-NFS lands.

Snowshoe hare are known to occur in the Canada lynx analysis area, although data on their population size are not available. Because of disturbance and fire history, habitat in the Canada lynx analysis area is not optimum for snowshoe hare, which require high canopy cover in mature conifer forests or lodgepole pine stands with dense understories (Ellsworth and Reynolds 2006). Garcia and Associates (2013) recorded snowshoe hare tracks at “many” locations during the 2013 winter field study, but population size cannot be estimated from these random observations. It is uncertain whether the lynx analysis area contains a snowshoe hare population adequate to support a lynx home range, which generally varies from 15 square miles to 69 square miles in Washington State where habitat is similar to Idaho (Ruediger et al. 2000). Larger home ranges generally correlated with lower prey availability.

Although there are no corridors or transition habitat in the SGP area, the Forest Service has drafted “lynx linkage areas” because of the importance of habitat connectivity for forest carnivores (Claar et al. 2004). As defined by Claar et al. (2004), lynx linkage areas are, “Habitat that provides landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks. Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions or other developments.” Linkage areas for Canada lynx have been estimated to occur North to South across Warm Lake Road (County Road [CR] 10-579) and East to West across the South Fork Salmon River (and likely also Johnson Creek Road (CR-10-413), the Stibnite Road portion of the McCall-Stibnite Road (CR 50-412), and the Burnt Log Road (National Forest System Road [FR] 447).

The few historical observations in the BNF Cascade Ranger District indicate that Canada lynx can occur in the PNF and BNF. However, the Forest Service conducted lynx detection surveys on the BNF Cascade Ranger District between 2001 and 2003 (Forest Service 2001, 2002, 2003b), and no Canada lynx were detected during these hair snag/DNA surveys. The closest confirmed lynx detection resulting from formal surveys from the National Survey Grid was on the Lowman Ranger District (BNF) in 1999, approximately 60 miles south of the Village of Yellow Pine area. The lack of lynx detections from the large body of hair snag and remote camera survey work, both in the Canada lynx analysis area and in the larger context of the surrounding ranger districts, suggests that the Canada lynx is rare in the PNF and BNF, and detections would be more likely from a dispersing individual rather than a resident (Forest Service 2018). Although lynx denning habitat exists on the BNF and is predicted to exist in the future across the PNF, there are no verified lynx dens or confirmed evidence of breeding. At present, occurrence of lynx in the Canada lynx analysis area is speculative.

3.13.3.2.2 NORTHERN IDAHO GROUND SQUIRREL

3.13.3.2.2.1 Species Status

In 2012, NIDGS was identified as a distinct species (Hoisington-Lopez et al. 2012). The NIDGS in now recognized as *Urocitellus brunneus*, while its former subspecies, southern Idaho ground squirrel, is recognized as *Urocitellus endemicus*. The USFWS revised the taxonomy of the species under ESA rulemaking in Federal Register (80 Federal Register 35860).

The NIDGS was listed as a threatened species under the ESA, as amended (61 Federal Register 7596). The Final Rule for this listing (65 Federal Register 17779) is dated April 5, 2002. The Recovery Plan for the Northern Idaho Ground Squirrel (Recovery Plan) was completed in 2003 (USFWS 2003). The plan summarizes objectives, criteria, and strategies for recovery of the species. The goal of the Recovery Plan is to increase population size and establish a sufficient number of viable metapopulations so that the species can be delisted. The number of metapopulations considered to be sufficient for recovery is identified as 10, with each consisting of more than 500 individuals for 5 consecutive years.

Decline of NIDGS throughout the 1980s and 1990s was attributed primarily to changes and loss of habitat that resulted in isolated populations. It also was hypothesized that land conversion and fire suppression resulted in poorer quality forage (Yensen 2004). Given the extremely low population levels and the disjunct and isolated habitat that presently occurs, population viability is still a concern for this species (Wisdom et al. 2000).

A 5-year review of the current ESA classification for NIDGS was completed in 2017 (81 Federal Register 7571-7573). Although several conservation actions have been implemented or scheduled by the Forest Service, IDFG, and U.S. Geological Survey since the last 5-year review, the recent review determined that the threats identified in the previous status review remained the same, particularly the primary threat of loss of suitable habitat, resulting from meadow invasion by conifers. Development of private lands within their limited range also continues to be a threat. The USFWS has initiated the Recovery Planning and Implementation process for NIDGS.

3.13.3.2.2.2 Baseline

NIDGS are rare, endemic (i.e., native and restricted to a certain area), small mammals whose current known distribution is limited to a disjunct population in an approximately 2,965-acre area of Valley County and another larger, approximately 265,143-acre, area in Adams County in west-central Idaho. It has one of the smallest ranges of all North American land mammals. In this range, NIDGS occur at approximately 60 sites with an elevation range of 3,445 to 7,546 feet above mean sea level. Occupied sites are variable in size (2.5 to greater than 247 acres) and squirrel density (Wagner and Evans-Mack 2017). Typical habitat includes dry montane meadows or open scablands surrounded by ponderosa pine or Douglas-fir forest (Suronen and Newingham 2013). In March or April, squirrels emerge from their underground burrows to mate and begin their brief aboveground activity period (Yensen 1991). Hibernation starts again in July or early August (Goldberg et al. 2017).

Approximately 2,042 acres of occupied habitat and 60,450 acres of modeled NIDGS habitat occur on the PNF. The largest amount of both habitat types, approximately 1,257 acres, is located in the Brownlee Watershed in close proximity to Bear, Idaho, which is well north and west of the NIDGS analysis area for the SGP. IDFG monitoring data from 2017 documented 308 individuals at 29 colony sites on PNF lands. Within the HUC 12 wildlife analysis area, there are approximately 17,917 acres of modeled suitable habitat (i.e., NIDGS analysis area).

The closest occupied site is located south of Cascade (Wagner and Evans-Mack 2017). In 2018, a survey was conducted in the modeled habitat in Scott Valley (June 19 to July 16) and along the Idaho Power Company transmission line alignment in Trout Creek (July 10 to July 12) (Yensen and Tarifa 2018). During the surveys, areas with moderate to highly suitable habitat were identified for future surveys (Yensen and Tarifa 2018). NIDGS did occur historically in the Warm Lake area but limited surveys have been conducted. Although no NIDGS or signs of their activity were observed at either site during the survey, there is a possibility that NIDGS may occur in the future at suitable sites. Site checks and formal surveys will be conducted, as needed, prior to ground-disturbing activities in suitable habitat.

3.13.3.2.3 WOLVERINE

3.13.3.2.3.1 Species Status

In February 2013, the USFWS published proposed rules to list the Distinct Population Segment of the North American wolverine in the contiguous U.S. as a threatened species, citing the primary threat to the species as loss of habitat and range as a result of climate change (USFWS 2013; 78 Federal Register 7863). This decision was subsequently withdrawn. On April 4, 2016, the U.S. District Court of Montana vacated the USFWS's withdrawal of its Proposed Rule (Case 9:14-CV-00246-DLC, Document 108; 81 Federal Register 71670). The proposed listing is currently under review and, pending a final decision on the status of the species by the USFWS, the Forest Service is directed to analyze the species as "proposed-threatened." Because wolverines are a proposed species, rather than listed, there has been no critical habitat designated for the species.

3.13.3.2.3.2 Baseline

The North American wolverine is the largest terrestrial member of the family Mustelidae (e.g., weasels, badgers, otters, ferrets, martens, minks, and wolverines, among others), with adult males weighing 26 to 40 pounds and adult females weighing 17 to 26 pounds (Banci 1994). Wolverines are opportunistic feeders, consuming a variety of foods depending on availability. They primarily scavenge carrion, but also prey on small animals and birds and eat fruits, berries, and insects (Banci 1994). They have an excellent sense of smell, enabling them to find food beneath deep snow, and can eat frozen meat and crush bones of large prey including deer, elk, and moose.

Wolverines are circumboreal (i.e., generally occurring throughout the northern portion of the northern hemisphere) in distribution, occurring in Europe, Asia, and North America. In western North America, the wolverine historically occurred in Alaska, Washington, Oregon, California, Nevada, Colorado, Utah, Montana, Wyoming, Idaho, and Canada. Wolverine habitat includes alpine tundra and all subalpine and montane forests (Wisdom et al. 2000). In the PNF and BNF, wolverines appear to strongly select for forest edges and concave landscapes, such as valleys. Wolverine distribution in Idaho is strongly correlated with snow, cold temperatures, high elevation montane habitats and rugged terrain, including talus slopes (Inman 2013). Spring snow cover (April 24 to May 15) is the best overall predictor of wolverine occupancy and appropriate levels of snow cover during the denning period is essential for successful wolverine reproduction. Wolverines have an extended mating period (from May to August) and give birth to kits in February to mid-March (IDFG 2014a). Dens tend to be in areas of high structural diversity with logs and large woody debris, large boulders, and deep snow (Inman et al. 2007). Den sites are usually located amongst rocks or root wads, within hollow logs, under fallen trees, or in dense vegetation (IDFG 2014a). Wolverine summer habitat in Idaho is associated with high-elevation whitebark pine communities with steep slopes and coarse talus (IDFG 2014a). The wolverine analysis area includes suitable habitat for the wolverine. The largest amount of high-quality wolverine habitat exists in the South Fork Salmon River watershed (approximately 231,659 acres), which includes areas adjacent to the FCRNRW.

Although new evidence suggests more social interaction, wolverines tend to be solitary and primarily nocturnal. They are active year-round and will travel during daylight hours. Wolverines have large spatial requirements, with home ranges varying in size depending on sex, age, availability of food, and differences in habitat (Banci 1994). Male and female home ranges in central Idaho are the largest reported for the species (Copeland 1996). A winter recreation study evaluated home range areas and estimated male minimum and maximum home range size at 154 and 833 square miles, respectively, with female ranges estimated from 49 to 162 square miles (Heinemeyer et al. 2017). Food availability and dispersion, spatial configurations of conspecifics (i.e., members of the same species), habitat, and topography also are suggested influences for wolverine home range selection and size (Banci 1994; Copeland 1996; Hornocker and Hash 1981). According to IDFG (2014a), wolverines also are territorial, which influences their home ranges. While male and female ranges can overlap, males avoid other male territories and females avoid other female territories. This is important because territoriality constraints define how wolverines can react to changes in habitat quality or displacement from occupied habitat.

Large carnivores are in global decline and have experienced effects from human-caused habitat fragmentation and loss throughout their range (Ripple et al. 2014). The Rocky Mountain region represents a carnivore “hotspot,” with species typically restricted to high elevation habitat. Wolverines in the contiguous U.S. exist as small and semi-isolated subpopulations as part of a larger metapopulation, which requires regular dispersal between habitat patches to maintain population stability. Wolverines naturally occur at low densities and have low reproductive rates. Wolverine populations in the Rocky Mountains are small (Schwartz et al. 2009). Although there are estimates for population carrying capacity in Idaho, there is currently no valid population estimate (IDFG 2014a).

The SGP area is located within two Wolverine Priority Conservation Areas, Tier 1 Game Management Units (GMUs) 25 and 26, as defined by the Management Plan for Conservation of Wolverines in Idaho, 2014-2019 (IDFG 2014a). Tier 1 are the highest scoring GMUs based on potential wolverine use, cumulative threats, and amount of unprotected habitat.

Historically, wolverines have been documented in the PNF and BNF within the wolverine analysis area (see **Table 3.13-4**). As shown on **Table 3.13-4** several of the observations include the same individuals. In 2010, the PNF, BNF, and Sawtooth National Forest collaborated with the Rocky Mountain Research Station, Round River Conservation Studies, IDFG, and other governmental and non-governmental organizations to assess wolverine populations and evaluate potential impacts to the species from winter recreation. The study was titled Wolverine-Winter Recreation Research Project: Investigating the Interactions Between Wolverines and Winter Recreation, and research efforts simultaneously and intensively monitored both wolverine and winter recreation use using global positioning system monitoring. The final report was released in December 2017 (Heinemeyer et al. 2017). The study results were updated in 2019 (Heinemeyer et al. 2019). Six years of trapping efforts (2010-2015) in the McCall study area confirmed 10 individual wolverines: six females (some of which were denning) and four males. See **Appendix K-3**, Life Histories, for more information about wolverine survey results and observations. The PNF and BNF contain known breeding habitat, and five den sites for four individuals (females) have been confirmed since 2010.

Table 3.13-4 Wolverine Documentation, including DNA Confirmation, Within or Adjacent to the Wolverine Analysis Area

Study/Observation	Dates	Animal ID	Sex / Age / Status	Trap Type/ Observation
Heinemeyer et al. 2017	1/30/2010-3/31/2010	F1.2010	Female/Denning	Log trap
Heinemeyer et al. 2017	1/15/2012-3/10/2012	F1.2012	Female/Not denning	Log trap
Heinemeyer et al. 2017	1/14/2014-4/19/2014	F10.2014	Female/Denning	Log trap
Heinemeyer et al. 2017	1/30/2010-3/21/2010	F2.2010	Female/Denning	Log trap
Heinemeyer et al. 2017	1/25/2011-4/10/2011	F2.2011	Female/Not denning	Log trap
Heinemeyer et al. 2017	2/20/2010-4/3/2010	F3.2010	Female/Denning	Log trap
Heinemeyer et al. 2017	1/4/2014-3/24/2014	F3.2014	Female/Not denning	Log trap
Heinemeyer et al. 2017	1/22/2011-3/16/2011	F4.2011	Female/Not denning	Log trap
Heinemeyer et al. 2017	1/30/2011-4/2/2011	F5.2011	Female/Denning	Log trap
Heinemeyer et al. 2017	2/20/2010-3/10/2010	M1.2010	Male	Log trap
Heinemeyer et al. 2017	1/18/2011-3/15/2011	M1.2011	Male	Log trap
Heinemeyer et al. 2017	1/25/2014-4/13/2014	M1.2014	Male	Log trap
Heinemeyer et al. 2017	1/11/2014-5/27/2014	M12.2014	Male	Log trap
Heinemeyer et al. 2017	2/5/2010-4/20/2010	M2.2010	Male	Log trap
Heinemeyer et al. 2017	2/10/2011-4/3/2011	M2.2011	Male	Log trap
Heinemeyer et al. 2017	2/11/2010-4/26/2010	M3.2010	Male	Log trap
IDFG	1/12/2007	N/A	Unknown	Sample - Incidental Observation
IDFG	9/1/1983	N/A	Unknown	Seen - Incidental Observation
IDFG	6/12/1982	N/A	Unknown	Seen - Incidental Observation
IDFG	5/14/2009	N/A	Unknown	Seen - Incidental Observation
IDFG	4/12/1994	N/A	Male	Hand - Inventory/Targeted Survey
IDFG	1/15/2014	N/A	Unknown	Hand - Incidental Observation
IDFG	1/18/2013	N/A	Female	Photographed - Remote Camera Station
IDFG	3/3/2015	N/A	Female	Photographed - Remote Camera Station
IDFG	3/4/2015	N/A	Unknown	Photographed - Remote Camera Station

Study/Observation	Dates	Animal ID	Sex / Age / Status	Trap Type/ Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	Male	Gun Brush Hair Snag
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	Female	Gun Brush Hair Snag
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Gun Brush Hair Snag
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Gun Brush Hair Snag
Garcia and Associates 2014	1/19/2014-3/19/2014	N/A	Male	Camera Observation; Gun Brush Hair Snag
Garcia and Associates 2014	1/19/2014-3/19/2014	N/A	Male	Camera Observation; Gun Brush Hair Snag

Table Source: Forest Service 2020

Persistent Snow Cover

Modeled persistent spring snow cover was utilized (**Appendix K-2**; Heinemeyer et al. 2017) (**Table 3.13-5**) to describe existing habitat for wolverines. Persistent spring snow cover modeling results largely represent female breeding habitat, and therefore may not account for movements of wolverine at different times of the year within the wolverine analysis area, or their use of varying habitat types.

Table 3.13-5 Persistent Snow Cover in the Wolverine Analysis Area

Snow Cover Years	Area (acres)
1	57,705
2	51,566
3	53,807
4	77,266
5	50,684
6	32,415
7	12,340

Table Source: Heinemeyer et al. 2017

Figure 3.13-4 shows the distribution of persistent late spring (i.e., April 24 to May 15) snow cover in the wolverine analysis area as modeled for the northern hemisphere from 2009 through 2015 (Heinemeyer et al. 2017). The model uses the number of years (out of seven) in which snow cover was present in the spring in selected terrestrial pixels (very small mapped areas).

This spring timeframe generally corresponds to the period of wolverine den abandonment. The overall wolverine analysis area includes a variety of habitats, including large areas that would typically not have persistent spring snow cover (i.e., Cascade Lake and Warm Lake Road). These are areas where wolverine are expected to travel through at different times of the year. Most dens and associated breeding habitat have been located in areas that were snow covered for 6 to 7 years. Hence, higher elevations on the eastern side of the wolverine analysis area are more likely to have persistent snow, and therefore higher quality habitat, in more years, compared to western portions of the wolverine analysis area. This has been confirmed by regular documentation of individuals using the area and predicted winter ranges based on global positioning system locations of collared animals.

3.13.3.3 Focal Species, including Region 4 Sensitive Species and Management Indicator Species

Many of the focal species selected for analysis for the SGP also are Region 4 Sensitive species. Those species are designated by Forest Service Regional Foresters for specific regions or forests. There are 16 Regional Forester Sensitive Species (sensitive mammals, birds, and reptiles/amphibians) from the Intermountain Region (Region 4 of the Forest Service) included in this analysis (**Table 3.13-2**).

The following 20 species (R4 Sensitive, MIS, focal species, or big game species) (see **Table 3.13-2**) have suitable habitat and documented occurrence or are assumed to occur in the wildlife analysis area: white-headed woodpecker, Lewis's woodpecker, American three-toed woodpecker, black-backed woodpecker, boreal owl, dusky grouse (summer), fisher, flammulated owl, great gray owl, northern goshawk, pileated woodpecker, silver-haired bat, mountain quail, gray wolf, peregrine falcon, Rocky Mountain bighorn sheep, Rocky Mountain elk, Townsend's big-eared bat, bald eagle, and Columbia spotted frog.

Additional species considered but excluded from this analysis due to the wildlife analysis area being outside of the species range or lack of modeled habitat include: Lazuli bunting, spotted bat, Harlequin duck, and yellow-billed cuckoo (Candidate species).

3.13.3.3.1 Habitat Family 1 – Low-Elevation, Old Forest

Family 1 includes wildlife species associated with low elevation, old forest vegetation types and has been identified as a habitat family of greatest conservation concern, due to widespread and substantial declines in habitat quantity across their range (**Appendix K-2**; Wisdom et al. 2000).

Family 1 wildlife species depend on single-story, and to a lesser extent, multi-story, lower elevation old forest stands as source habitats. Family 1 source habitat occurs in large tree, low canopy cover conditions in PVGs 1, 2, 3, and 5, and in those habitat types of PVG 6 where ponderosa pine is a major seral component (see **Table 3.10-1**). Special features of this source habitat are large-diameter live trees and snags (Wisdom et al. 2000). Historically, these habitat types were maintained in a relatively open condition by frequent, nonlethal fire.

White-headed woodpecker. The white-headed woodpecker is a Region 4 Sensitive species, a PNF and BNF MIS, and Idaho SGCN. The white-headed woodpecker is a regional endemic species of the Interior Northwest and may be particularly vulnerable to environmental change because it occurs in limited distribution, with narrow habitat requirements in dry conifer forests. The white-headed woodpecker is closely tied to mature ponderosa pine forests, with live and dead ponderosa pine trees greater than (>) 20 inches dbh in open canopy conditions (**Appendix K-2**). To meet their various ecological needs, white-headed woodpeckers also require heterogeneous (i.e., mixed or varied) landscapes characterized by a mosaic of open- and closed-canopied ponderosa pine forest (**Appendix K-2**). Although white-headed woodpeckers have not been documented in the analysis area, they may pass through. They are expected to be uncommon and due to specific breeding habitat requirements, are not expected to breed and nest in the wildlife analysis area. The closest recorded observations are approximately 6 miles north and 16 miles west of the proposed mine site (Forest Service 2017a).

On the PNF and BNF, vegetative communities that may provide source habitat conditions include PVGs 1, 2, 3, 5, and 6 (Nutt et al. 2010). While the drier habitat types in PVGs 3 and 6 can develop cover types with ponderosa pine in the larger size classes and open canopies, these conditions are not found as commonly as in PVGs 1, 2, and 5 across the PNF and BNF. Large diameter snags are an essential habitat feature for white-headed woodpecker. Current breeding habitat on the PNF is concentrated on the west side of the Forest, on the Council and New Meadows Ranger Districts.

Approximately 5,069 acres of white-headed woodpecker modeled source habitat occurs in the wildlife analysis area (**Table 3.13-6**; **Figure 3.13-6**). The highest acreages of modeled habitat are concentrated in the following subwatersheds: Loosum Creek – East Fork South Fork Salmon River, No Mans Creek – East Fork South Fork Salmon River, Quartz Creek, Porcupine Creek – Johnson Creek, and Goat Creek – South Fork Salmon River.

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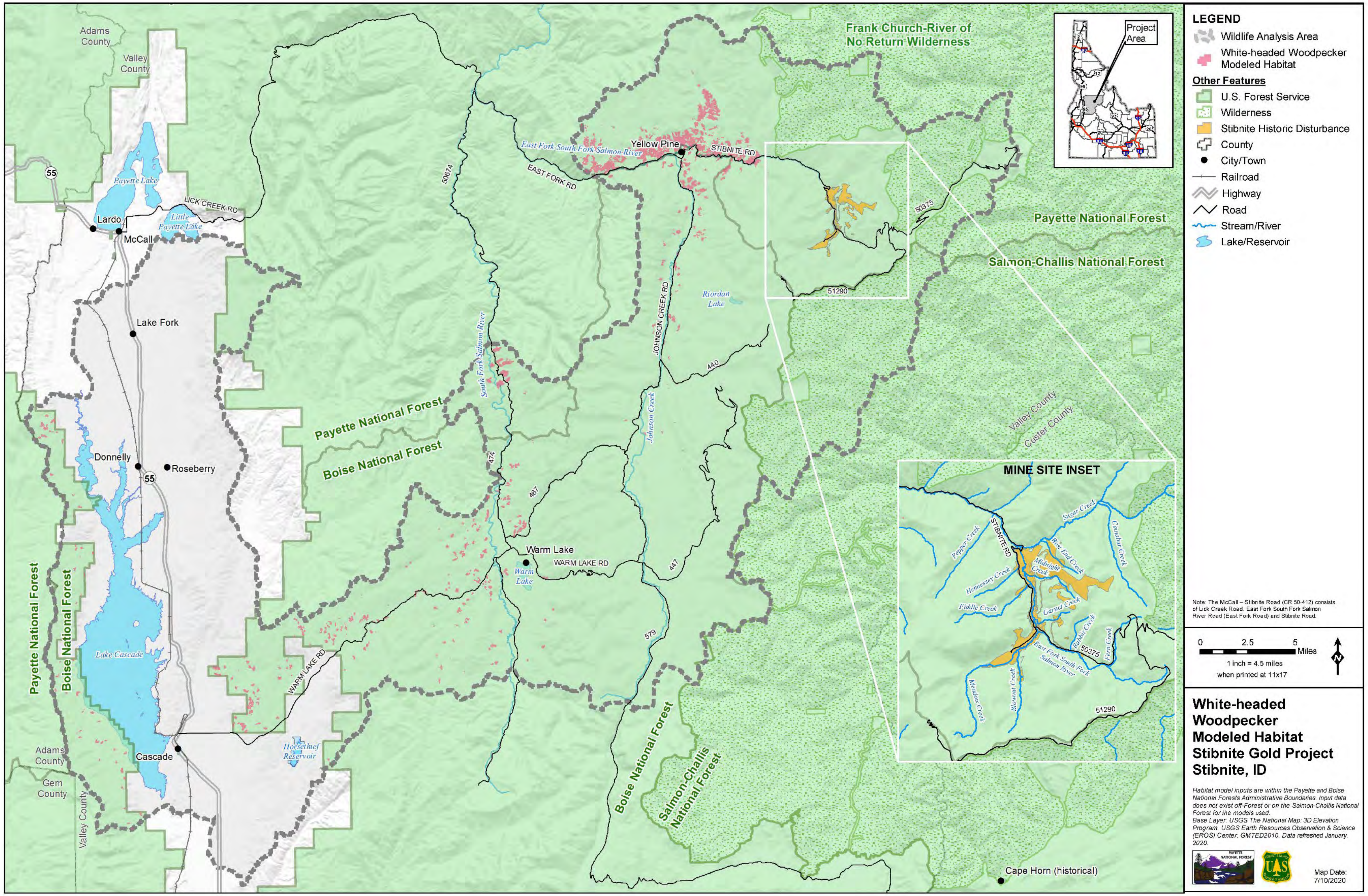

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-6 White-headed Woodpecker Modeled Habitat

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Table 3.13-6 White-headed Woodpecker Modeled Source Habitat, by PVG and Tree Size / Canopy Cover Class, in the Wildlife Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 1 (acres)	PVG 2 (acres)	PVG 3 (acres)	PVG 5 (acres)	PVG 6 (acres)	Totals
Large / Low	1,030	1,595	6	132	87	2,851
Large / Low-Medium	121	319	14	74	128	655
Large / Medium	139	844	15	93	113	1,203
Very Large[1] / Low	0	8	0	4	4	15
Very Large / Low-Medium	0	5	0	2	10	18
Very Large / Medium	0	3	0	1	0	4
Total NFS Lands	**1,290**	**2,773**	**35**	**306**	**341**	**4,745**
Large / Low	0	21	0	3	3	27
Large / Low-Medium	1	51	6	14	24	96
Large / Medium	0	120	0	44	37	201
Total Non-NFS Lands	**1**	**192**	**7**	**61**	**63**	**324**
Total All Lands	**1,291**	**2,965**	**42**	**367**	**404**	**5,069**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

Lewis's Woodpecker. The Lewis's woodpecker is an Idaho SGCN (Tier 2 – Vulnerable in Idaho). This woodpecker is closely associated with recent burns and responds favorably to stand-replacing fires (Tobalske 1997), whereas habitat for other Family 1 species is usually maintained by frequent, low-intensity burns that retain large and old-forest habitat. The Lewis's woodpecker is characterized as a 'burn specialist' due to its preference for nesting within burned pine forests (**Appendix K-2**). Distribution is closely associated with open ponderosa pine forest in the western U.S. and fire-maintained old-growth ponderosa pine (**Appendix K-2**). Suitable habitat conditions include an open canopy, abundant arthropod (e.g., insects and spiders) prey, shrubby understory, and availability of nest cavities and perches (**Appendix K-2**).

Approximately 4,141 acres of Lewis's woodpecker modeled source habitat occurs in the wildlife analysis area (**Table 3.13-7**; **Figure 3.13-7**). A large portion of the modeled source habitat is in the following subwatersheds: No Man's Creek – East Fork South Fork Salmon River, Loosum Creek – East Fork South Fork Salmon River, Quartz Creek, Goat Creek – South Fork Salmon River, and Porcupine Creek – Johnson Creek.

Table 3.13-7 Lewis's Woodpecker Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 1 (acres)	PVG 2 (acres)	PVG 5 (acres)	Totals
Large / Low	1,238	2,022	186	3,446
Large / Low-Medium	138	368	75	581
Very Large[1] / Low	0	8	4	12
Very Large / Low-Medium	0	5	2	8
Total NFS Lands	**1,376**	**2,403**	**268**	**4,047**
Large / Low	2	23	3	28
Large / Low-Medium	1	51	14	66
Total Non-NFS Lands	**3**	**75**	**17**	**94**
Total All Lands	**1,379**	**2,478**	**284**	**4,141**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

3.13.3.3.2 HABITAT FAMILY 2 – BROAD ELEVATION OLD FOREST

Species in Family 2 use late-seral, multi- and single-layered stages of the montane community as source habitats (Wisdom et al. 2000). Source habitats for some species also include late-seral stages of the subalpine community or the lower montane community, or both. Source habitat for Family 2 overlaps Family 1; however, it encompasses a broader array of cover types and elevations (Wisdom et al. 2000). Family 2 source habitat occurs primarily in PVGs 3 through 11 (Forest Service 2003a, Appendix E), although some species use lower elevation types. Historical fire regimes in Family 2 vary by PVG, but are dominated by mixed severity and lethal regimes (Forest Service 2003a, Appendix A).

Species that comprise Family 2 tend to be habitat generalists that use a wide range of conditions. Many are associated with both the large and medium tree size class forests in moderate- to high-stand canopy conditions. Some Family 2 species can take advantage of PVGs that exhibit uncharacteristically high tree densities and amounts of shade-tolerant tree species that have resulted from fire suppression and/or past management activities. As forest conditions increase in density and shade-tolerant species become more common throughout the landscape (either from suppression of fire or past vegetation management), the quantity and interconnectedness of Family 2 habitat increases.

American (Northern) three-toed woodpecker. The American three-toed woodpecker is a Region 4 Sensitive species that uses mature to old-growth, recently burned forests, and areas affected by pine bark beetles (Wiggins 2004). Saab et al. (2018) observed that the American three-toed woodpecker diet can consist almost entirely of spruce beetles, and they feed under the bark of freshly killed Engelmann spruce. The three-toed woodpecker is associated with disturbance events such as mountain pine beetle infestations and wildfire events that create areas with high densities of snags and insect prey (**Appendix K-2**; Wisdom et al. 2000). Three-toed woodpecker populations typically peak during the first 3 to 5 years after a fire.

Three-toed woodpeckers can utilize some forested conditions that are not within the historical range of variability under PVGs 5 and 11. These conditions generally consist of higher tree densities and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes. These dense conditions also would make stands more susceptible to insect infestations or stand-replacing wildfire important for disturbance-related species. For PVG 5, when functioning outside HRV, the Medium-High and High tree canopy cover class are included when in the Medium, Large, and Very Large tree size classes. For PVG 11, when functioning outside HRV, the High tree canopy cover class is included when in the Medium, Large, and Very Large tree size classes.

Therefore, Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes are recommended for use in the source habitat model for American three-toed woodpecker, for both within and outside of the HRV. Selecting forested stands in the Medium-High (45 to 59 percent) and High (>60 percent) tree canopy cover classes also are recommended for modeling American three-toed woodpecker source habitat.

Although three-toed woodpeckers have not been recorded in the wildlife analysis area, and the closest observation in the Forest Service database is approximately 12 miles north of the wildlife analysis area (Forest Service 2017a), the habitat profile and burn history of the area could be attractive to the species, and it is likely they could occur. Approximately 21,529 acres of American three-toed woodpecker modeled source habitat occurs in the wildlife analysis area (**Table 3.13-8**; **Figure 3.13-8**). The highest acreages of modeled habitat, similar to black-backed woodpecker, occur in the following subwatersheds: Tamarack Creek, Curtis Creek, Boulder Creek, Duck Creek – Cascade Reservoir, and Lunch Creek – Johnson Creek.

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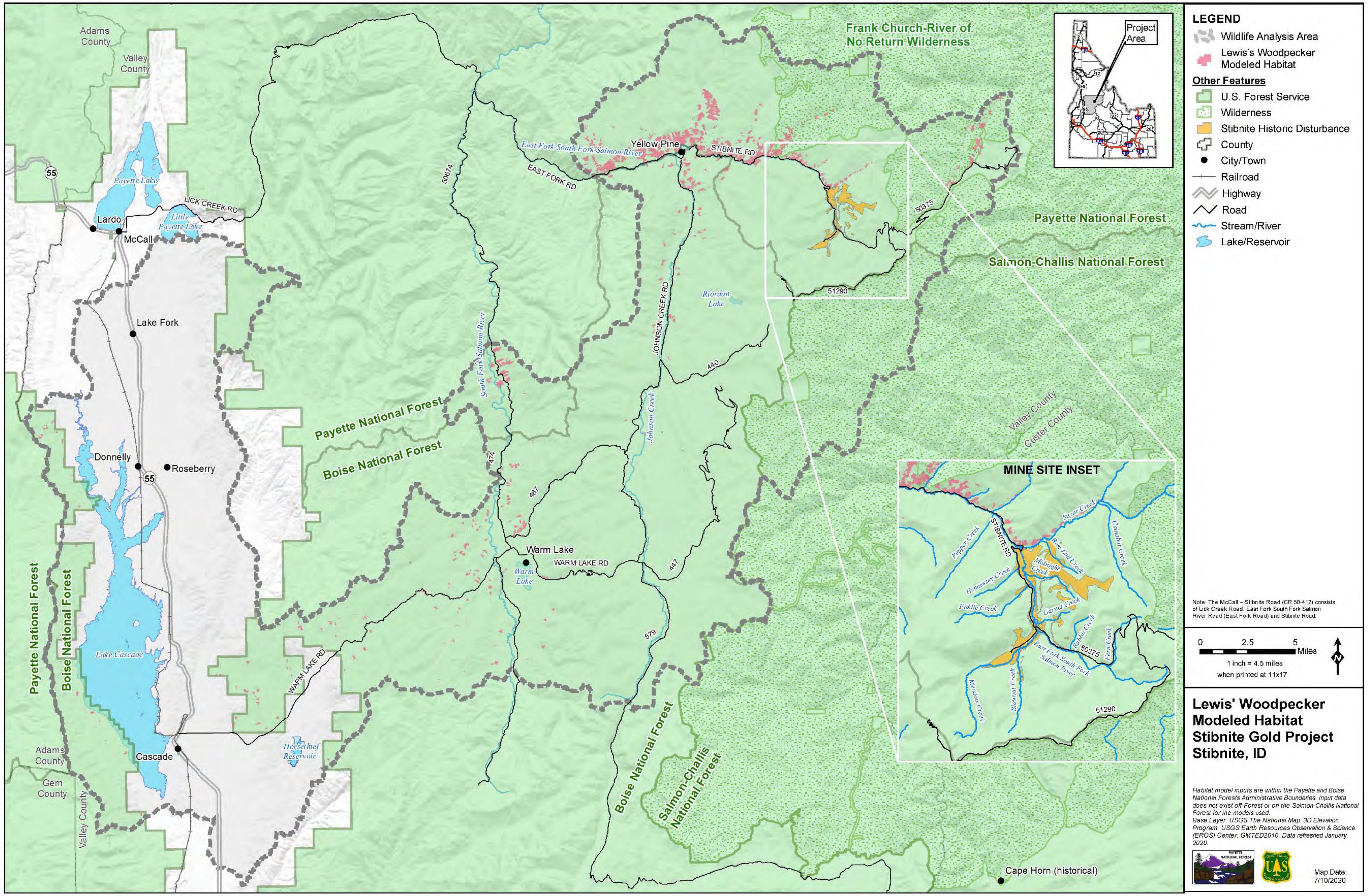

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-7 Lewis' Woodpecker Modeled Habitat

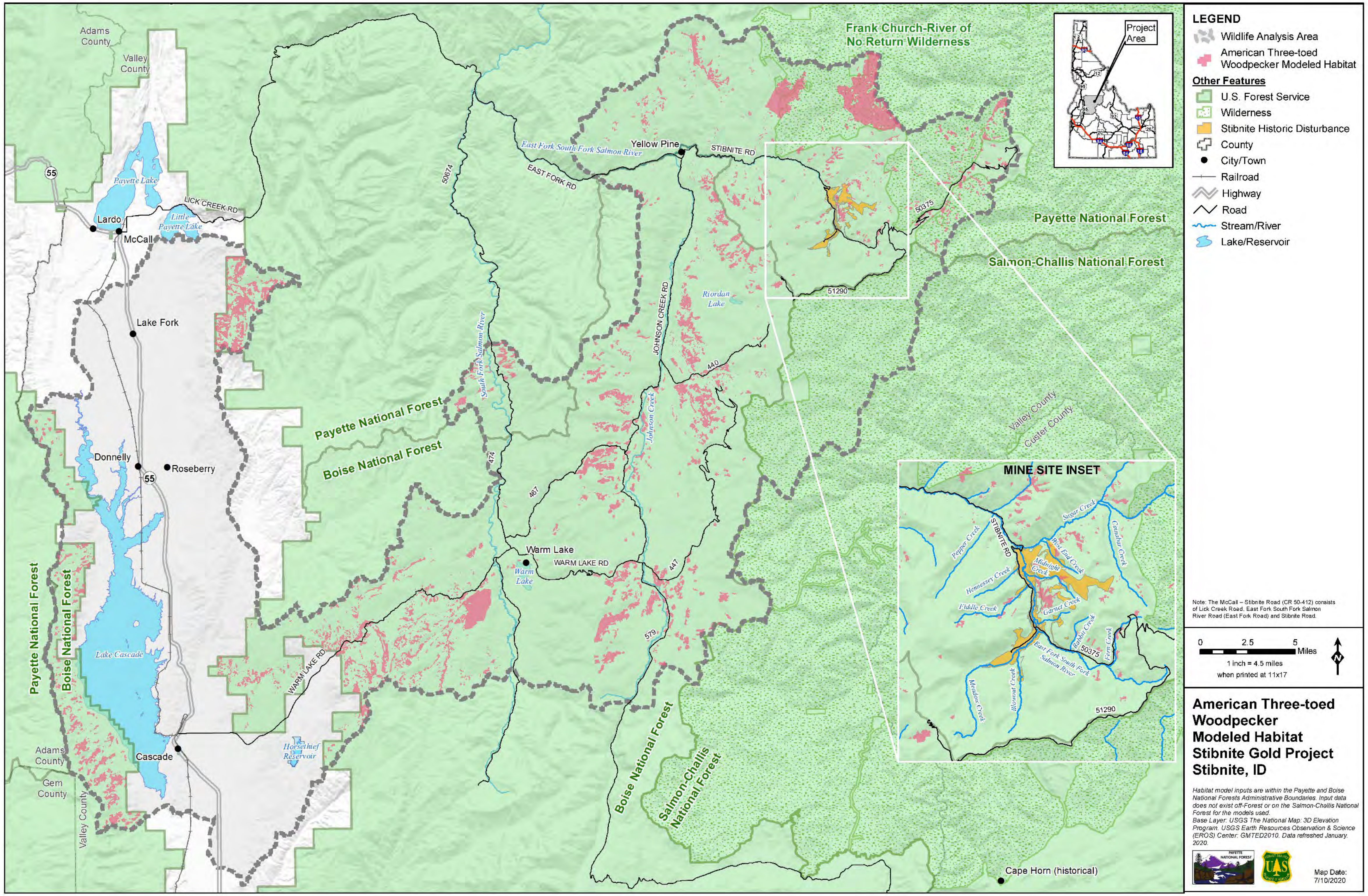

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-8 American Three-toed Woodpecker Modeled Habitat

Table 3.13-8 American Three-toed Woodpecker Modeled Source Habitat, by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS lands)

Tree Size / Canopy Cover Class	Combined PVGs – 2,5,11[1] (acres)	PVG 3 (acres)	PVG 4 (acres)	PVG 6 (acres)	PVG 7 (acres)	PVG 8 (acres)	PVG 9 (acres)	PVG 10 (acres)	Totals (acres)
No Tree / Sapling / Small[1]	240	0	114	152	2,209	0	7	649	3,371
Medium / Low	3	0	21	8	101	0	4	47	184
Medium / Low-Medium	55	13	65	55	11	0	0	1	200
Medium / Medium	40	10	54	52	2	0	0	25	183
Medium / Medium-High	1,751	0	64	218	161	804	699	7,064	10,762
Medium / High	353	0	20	37	187	303	99	1,789	2,788
Large / Low	4	0	4	1	307	0	0	181	497
Large / Low-Medium	3	0	4	7	27	0	0	30	72
Large / Medium	10	1	1	1	48	0	0	51	110
Large / Medium-High	230	0	1	1	70	133	69	721	1,225
Large / High	71	0	5	0	103	25	7	327	538
Total NFS Lands	**2,758**	**25**	**352**	**533**	**3,226**	**1,265**	**885**	**10,885**	**19,929**
Medium / Medium-High	536	0	0	0	0	500	110	252	1,398
Medium / High	91	0	0	0	0	23	1	48	162
Large / Medium-High	24	0	0	0	0	4	3	3	34
Large / High	0	0	0	0	0	4	1	1	6
Total Non-NFS Lands	**651**	**0**	**0**	**0**	**0**	**531**	**114**	**304**	**1,600**
Total All Lands	**3,409**	**25**	**352**	**533**	**3,226**	**1,796**	**999**	**11,189**	**21,529**

Table Source: Forest Service 2020

Table Notes:

1 Combined PVGs = subset of additional PVGs for habitat used outside of HRV.

Black-backed woodpecker. The black-backed woodpecker is a BNF MIS and focal species that uses montane and boreal coniferous forests with standing snags. This species is associated with disturbance events such as mountain pine beetle infestations and wildfire that create areas with high densities of snags and insect prey (**Appendix K-2**; Wisdom et al. 2000). They are strongly associated with recently burned forests (often colonizing them within one year after a fire) and excavate nests in snags (Saab et al. 2009).

On the PNF and BNF, vegetative communities that may provide source habitat conditions for black-backed woodpecker include PVGs 8, 9, 10, and 11 in the Medium and Large tree size classes and with moderate or high canopy cover (Nutt et al. 2010). PVG 5 also can provide source habitat when outside of the HRV. It is recommended that Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes be used to model source habitat for the black-backed woodpecker, both for within and outside the HRV. Mountain pine beetle infestations and/or high intensity fire events are primary recycling agents in these PVGs; both are disturbances associated with woodpecker habitat and population irruptions. Snags are a special habitat feature for woodpeckers and provide nesting and foraging opportunities. Studies indicate that black-backed woodpeckers can utilize a wide range of canopy covers that fall within the Low-Medium, Medium, Medium-High, and High canopy cover classifications.

Approximately 49,427 acres of black-backed woodpecker modeled source habitat occurs in the analysis area (**Table 3.13-9**; **Figure 3.13-9**). A large portion of the modeled source habitat is in the following subwatersheds, similar to areas modeled for other fire-associated woodpeckers: Curtis Creek, Tamarack Creek, Upper Big Creek, Duck Creek – Cascade Reservoir, and Boulder Creek.

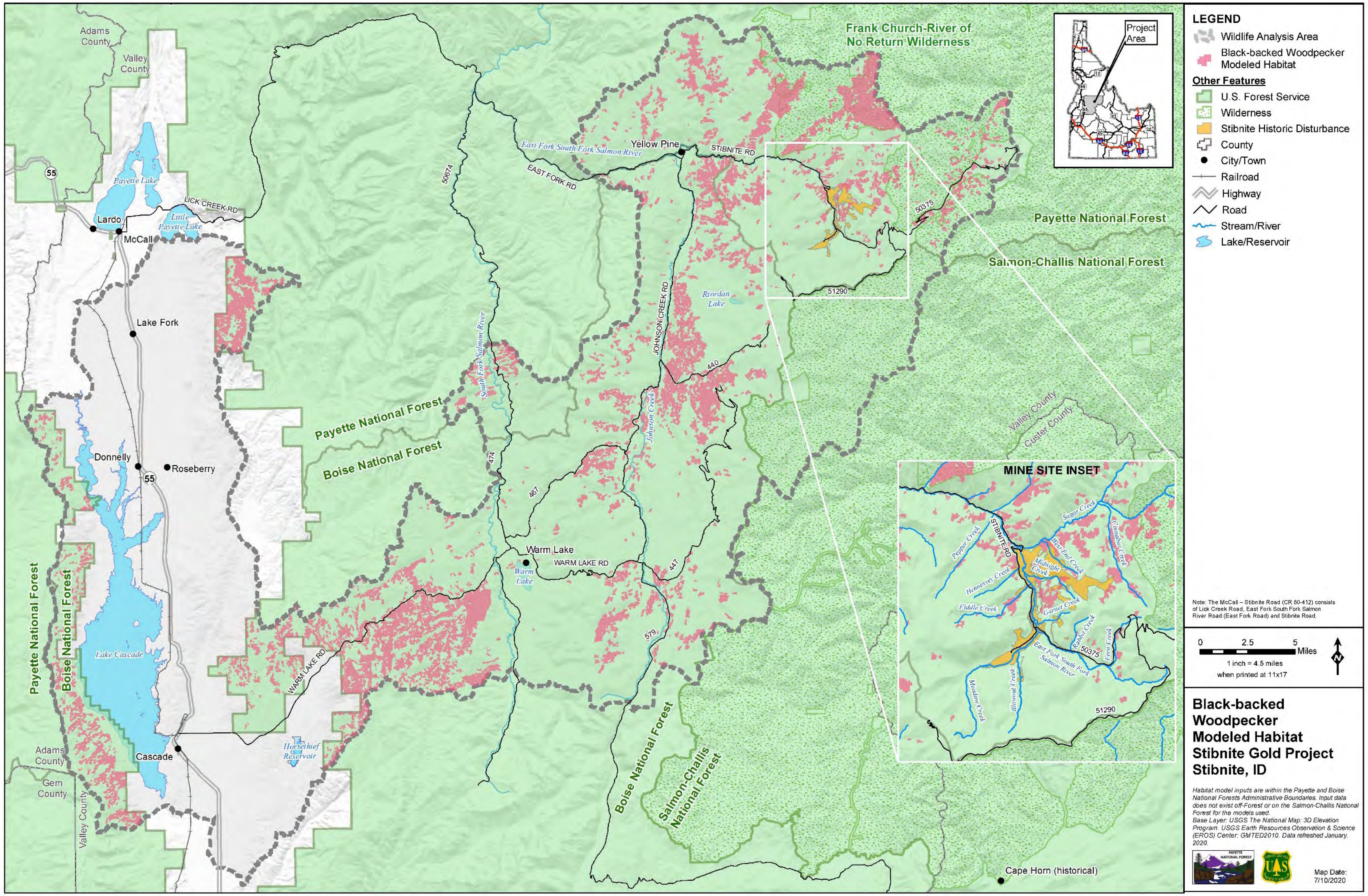

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-9 Black-backed Woodpecker Modeled Habitat

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Table 3.13-9 Black-backed Woodpecker Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS lands)

Tree Size / Canopy Cover Class	Combined PVGs – 2,5,11[1] (acres)	PVG 3 (acres)	PVG 4 (acres)	PVG 6 (acres)	PVG 7 (acres)	PVG 8 (acres)	PVG 9 (acres)	PVG 10 (acres)	Totals (acres)
No Tree / Sapling / Small	240	0	114	152	2,209	0	10	649	3,375
Medium / Low	3	0	21	8	101	0	4	47	184
Medium / Low-Medium	58	13	65	55	11	0	0	1	204
Medium / Medium	40	10	54	52	2	0	0	25	184
Medium / Medium-High	56	69	4,400	3,927	9,680	804	699	7,064	26,700
Medium / High	38	23	1,383	1,089	4,236	303	99	1,789	8,960
Large / Low	4	0	4	1	307	0	0	181	497
Large / Low-Medium	3	0	4	7	27	0	0	30	72
Large / Medium	10	1	1	1	48	0	0	51	111
Large / Medium-High	6	6	803	232	1,495	133	69	721	3,465
Large / High	16	2	573	120	1,007	25	7	327	2,077
Total NFS Lands	**471**	**125**	**7,423**	**5,645**	**19,124**	**1,265**	**888**	**10,886**	**45,827**
Medium / Medium-High	0	37	446	1,000	835	500	110	252	3,181
Medium / High	0	1	17	170	48	23	1	48	307
Large / Medium-High	0	2	12	35	21	4	3	3	79
Large / High	0	0	0	8	20	4	1	1	34
Total Non-NFS Lands	**0**	**41**	**475**	**1,213**	**923**	**531**	**114**	**304**	**3,600**
Total All Lands	**471**	**166**	**7,898**	**6,858**	**20,047**	**1,796**	**1,002**	**11,190**	**49,427**

Table Source: Forest Service 2020

Table Notes:

1 Combined PVGs = subset of additional PVGs for habitat used outside of HRV.

Dusky grouse (summer). Dusky grouse is a focal species for the PNF and BNF. This species is closely related to sooty grouse and the two species were, until recently, considered a single species, blue grouse. Dusky grouse is a large grouse associated with mountain forest which contain ponderosa and lodgepole pine, aspen, and fir. This species is a forest dwelling grouse native to the Rocky Mountains, a permanent resident on the PNF and BNF, which moves to higher elevations in winter.

While herblands, grasslands, and shrublands (e.g., mountain mahogany, choke-cherry, serviceberry, rose, bitterbrush, sagebrush) are commonly described as summer habitat, use of these habitats primarily occurs when they are within or adjacent to forested stands, typically within open ponderosa pine or Douglas fir habitat types (**Appendix K-2**; Wisdom et al. 2000). Wisdom et al. (2000) described dusky grouse summer source habitat as contrast habitat that occurs on the interface between forest and openings and generally at lower elevations than in winter. These openings, whether natural or created by harvest or fire, can develop an inter-mix of herb, shrub, and/or seedling vegetation that provides cover and forage for dusky grouse, and yet are still within the larger matrix of a later seral forest. This kind of mosaic commonly occurs in the lower range of tree canopy covers.

Modeled summer source habitat for dusky grouse includes Seedling (4.5 feet tall), Sapling (0.1 to 4.9 inches dbh), Small (5 to 9.9 inches dbh), Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes. Forested stands in the Low (10 to 19 percent) and Low-Medium (20 to 29 percent) tree canopy cover classes also were selected.

Approximately 20,509 acres of dusky grouse modeled source habitat occurs in the analysis area (**Table 3.13-10**; **Figure 3.13-10**). The highest acreages of modeled habitat are concentrated in the following subwatersheds: Upper Big Creek, Six-bit Creek – South Fork Salmon River, Goat Creek – South Fork Salmon River, Porcupine Creek – Johnson Creek, and Loosum Creek – East Fork South Fork Salmon River.

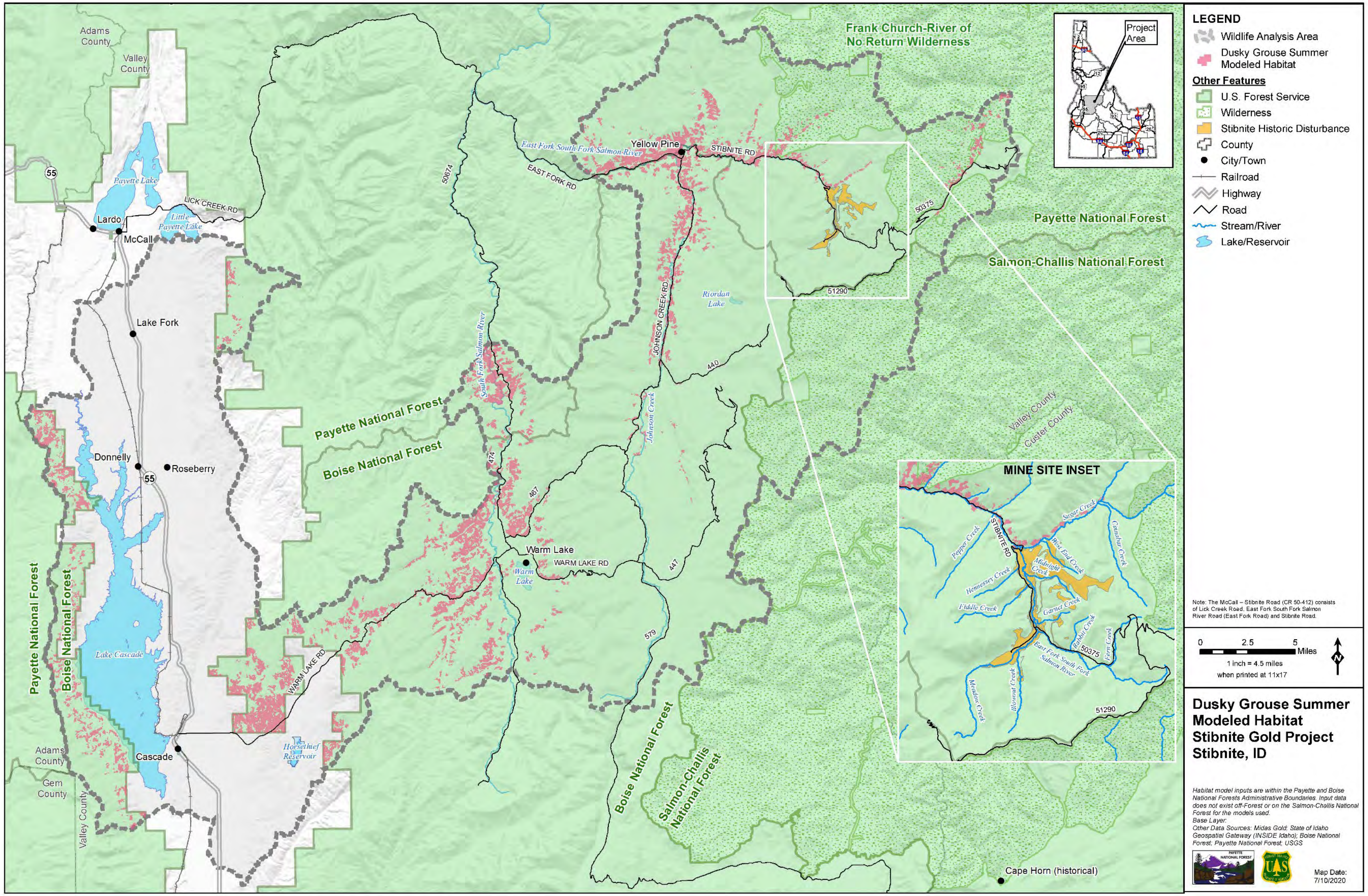

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-10 Dusky Grouse Summer Modeled Habitat

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Table 3.13-10 Dusky Grouse Modeled Summer Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS lands)

Tree Size / Canopy Cover Class	PVG 1 (acres)	PVG 2 (acres)	PVG 3 (acres)	PVG 5 (acres)	PVG 6 (acres)	Total (acres)
Seedling / Sapling / Small	193	1,989	66	705	1,386	4,338
Medium / Low	215	2,061	122	699	1,009	4,107
Medium / Low-Medium	92	1,457	111	700	1,485	3,844
Large / Low	1,238	2,022	6	186	94	3,546
Large / Low-Medium	138	368	15	75	131	727
Very Large[1] / Low	0	8	0	4	4	15
Very Large / Low-Medium	0	5	0	2	10	18
Total NFS Lands	**1,875**	**7,910**	**320**	**2,371**	**4,118**	**16,595**
Seedling / Sapling / Small	8	831	29	349	587	1,804
Medium / Low	1	176	11	146	282	616
Medium / Low-Medium	5	594	36	305	428	1,367
Large / Low	2	23	0	3	3	31
Large / Low-Medium	1	51	6	14	24	96
Total Non-NFS Lands	**16**	**1,675**	**83**	**817**	**1,323**	**3,915**
Total All Lands	**1,892**	**9,585**	**402**	**3,188**	**5,442**	**20,509**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

Boreal owl. The boreal owl is a Region 4 Sensitive species. The boreal owl requires mature conifer forests with moderate to high canopy cover and snags. This species is strongly associated with higher elevation subalpine fir / spruce-fir habitats (>5,000 feet elevation), where their dominant prey food, red-backed vole, is available. Boreal owls, as secondary cavity nesters, also are highly dependent on pileated woodpeckers and northern flickers for nest cavities (**Appendix K-2**). Association of foraging and nesting habitat, snags, and downed wood for nest sites and prey habitat, are special habitat features not represented by the model.

This species has been documented in the wildlife analysis area at higher elevations. The nesting/fledging period is April through July (IDFG 2012). The species has been documented, particularly in the mine site, village of Yellow Pine, and Landmark areas, and most likely breeds in the wildlife analysis area. Approximately 28,602 acres of modeled source habitat is present (**Table 3.13-11**; **Figure 3.13-11**). The highest acreages of modeled habitat occur in the following subwatersheds: Upper Big Creek, Curtis Creek, No Man’s Creek – East Fork South Fork Salmon River, Boulder Creek, Burntlog Creek, and Trapper Creek – Johnson Creek.

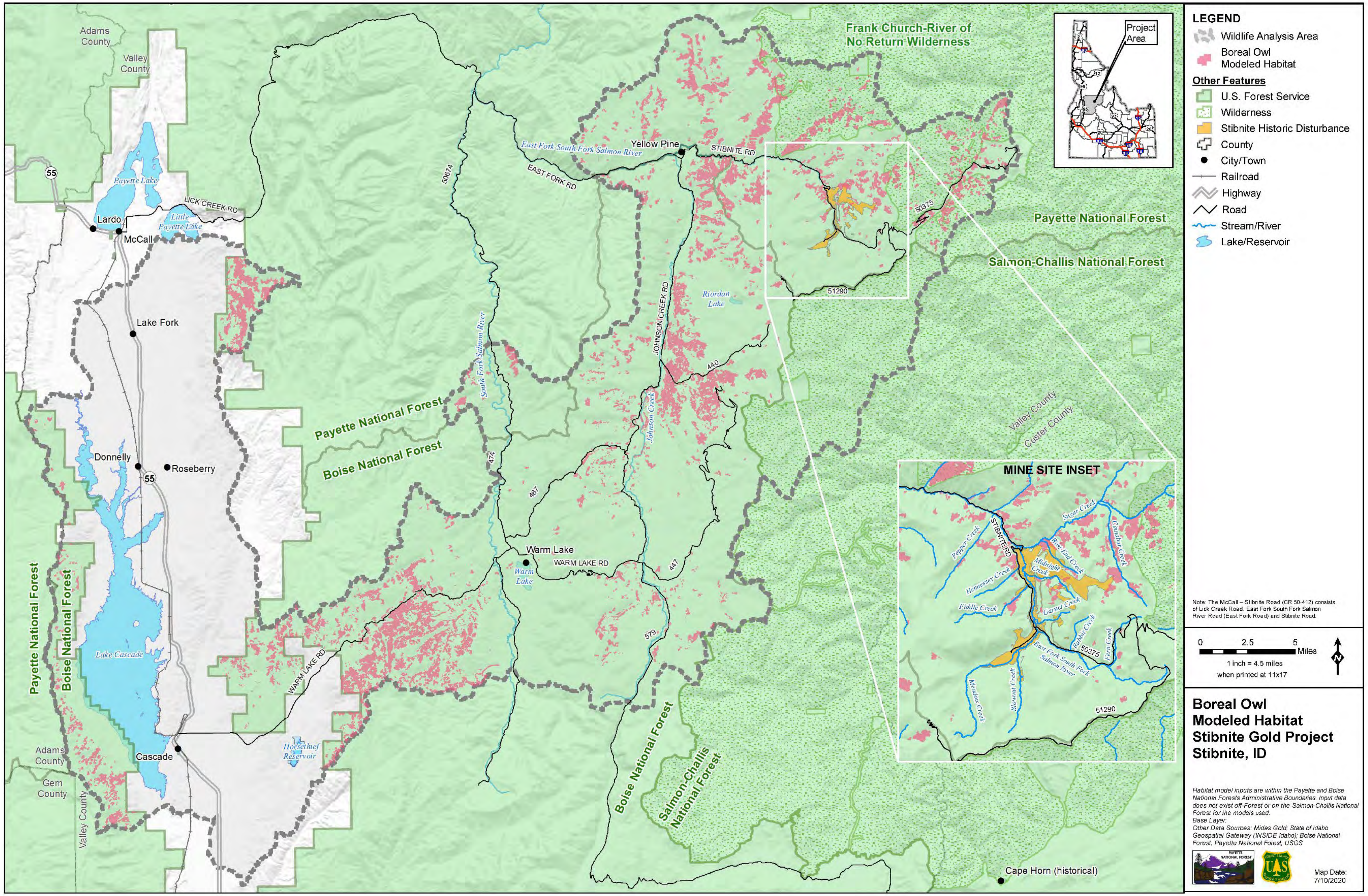

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-11 Boreal Owl Modeled Habitat

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Table 3.13-11 Boreal Owl Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 3 (acres)	PVG 4 (acres)	PVG 7 (acres)	PVG 8 (acres)	PVG 9 (acres)	PVG 11 (acres)	Totals (acres)
Medium / Medium-High	69	4,400	9,680	804	699	465	16,117
Medium / High	23	1,383	4,236	303	99	156	6,220
Large / Medium-High	6	803	1,495	133	69	40	2,547
Large / High	2	573	1,007	25	7	26	1,640
Very Large[1] / High	0	0	0	0	0	0	0
Total NFS Lands	**100**	**7,160**	**16,419**	**1,265**	**874**	**687**	**26,524**
Medium / Medium-High	37	446	835	500	110	14	1,942
Medium / High	1	17	48	23	1	1	91
Large / Medium-High	2	12	21	4	3	0	41
Large / High	0	0	20	4	1	0	25
Total Non-NFS Lands	**41**	**475**	**923**	**531**	**114**	**14**	**2,098**
Total All Lands	**140**	**7,635**	**17,342**	**1,796**	**988**	**701**	**28,602**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

Fisher. The fisher, a large member of the weasel family, is a Region 4 Sensitive species and a SGCN. The species was previously granted candidate species status by the USFWS for the West Coast Distinct Population Segment (68 Federal Register 41169; July 10, 2003), but listing was determined to be “not warranted” for the Rocky Mountain Region Distinct Population Segment (76 Federal Register 38504; June 30, 2011). The Forest Service has fisher survey units located across the PNF and BNF and the most recent state monitoring was conducted in 2018-2019 (IDFG 2019). Although commercial harvest of fishers in Idaho has been closed for more than 60 years, fisher populations have not recovered in western portions of their range (Lofroth et al. 2010; USFWS 2010). On the PNF, incidental trapping continues to be a mortality issue for fisher.

In the western U.S., fishers use coniferous and mixed mature forests, often in riparian corridors and drainages (Meyer 2007; Raley et al. 2012). Sauder and Rachlow (2014; 2015) found that fisher core use areas were often composed of moderate amounts of high canopy cover forest and moderate landscape edge density, and that forest heterogeneity was an important factor in habitat selection. Olson et al. (2014) also found that the probability of fisher occurrence was highest in mesic (i.e., containing a moderate amount of moisture) forest types with tall trees (i.e., between 25 and 50 meters), high annual precipitation, and mid-range winter temperatures. This is supported by Schwartz et al. (2013), who found that fishers disproportionately used late successional forests with large diameter trees in their study in the Northern Rocky Mountain region. They den in cavities of dead snags, living trees, or in downed trees greater than 20 inches dbh (Meyer 2007). Coarse woody debris on the forest floor also is an important habitat feature. In conifer forests of Idaho, fishers have very large home ranges. Average home range size estimates are approximately 2,400 to 10,000 acres for females and 7,400 to 20,000 acres for males (Jones 1991; Olson et al. 2014).

Vegetative communities that may provide source habitat conditions include PVGs 3, 6, 8, 9, and 10 in medium and large tree size classes and moderate or high canopy cover classes (Nutt et al. 2010). These PVGs have the capability to develop mesic, old forest, multi-layer conditions with moderate and high canopy closures that would provide for the structural diversity that is characteristic of fisher source habitat. Special habitat features include riparian corridors (travel, prey patches), down logs (resting and den sites), and snags (resting and den sites).

Approximately 19,712 acres of modeled source habitat occurs in the wildlife analysis area (**Table 3.13-12**; **Figure 3.13-12**). The highest acreages of modeled source habitat occur in the following subwatersheds: Duck Creek – Cascade Reservoir, Curtis Creek, Boulder Creek, Upper Big Creek, and Lunch Creek – Johnson Creek.

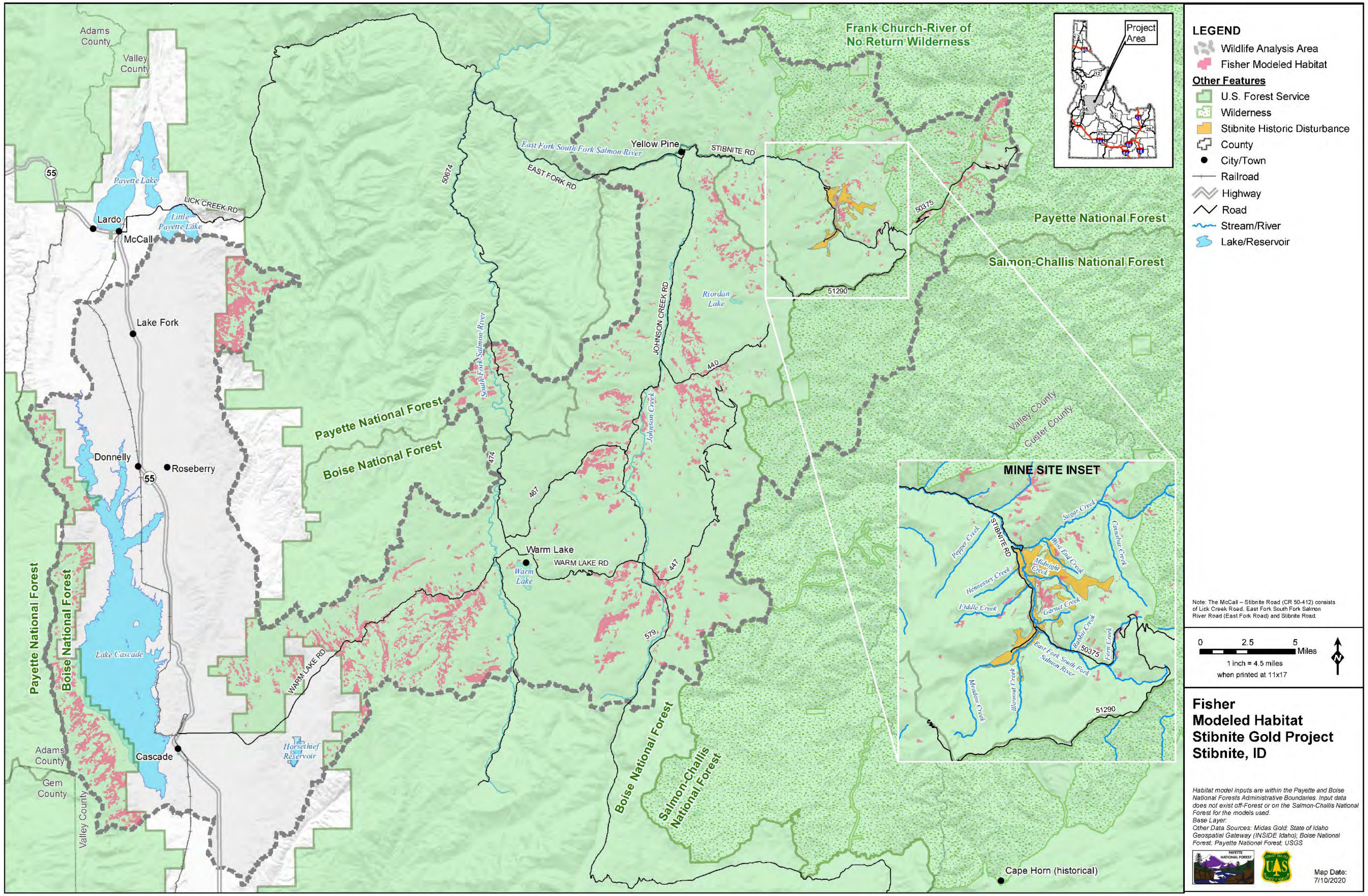

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-12 **Fisher Modeled Habitat**

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Table 3.13-12 Fisher Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 3 (acres)	PVG 6 (acres)	PVG 8 (acres)	PVG 9 (acres)	PVG 10 (acres)	Total (acres)
Medium / Medium-High	69	3,927	804	699	7,064	12,564
Medium / High	23	1,089	303	99	1,789	3,303
Large / Medium-High	6	232	133	69	721	1,161
Large / High	2	120	25	7	327	482
Total NFS Lands	**100**	**5,369**	**1,265**	**874**	**9,902**	**17,510**
Medium / Medium-High	37	1,000	500	110	252	1,899
Medium / High	1	170	23	1	48	242
Large / Medium-High	2	35	4	3	3	47
Large / High	0	8	4	1	1	14
Total Non-NFS Lands	**41**	**1,213**	**531**	**114**	**304**	**2,202**
Total All Lands	**140**	**6,581**	**1,796**	**988**	**10,206**	**19,712**

Table Source: Forest Service 2020

Flammulated owl. Flammulated owl, a Region 4 Sensitive species, is a cavity nester that prefers stands of medium to large trees (ponderosa pine, Douglas-fir, and aspen) with moderate canopy closure (Forest Service 2012). Occupied habitat is strongly associated with upper slopes (upper third) or ridges (**Appendix K-2**). This species is highly migratory and, as an insectivore, would only occur in the SGP area during warmer time periods when insects, particularly moths, are available. Breeding home ranges average approximately 35 acres. Nesting occurs in April and May, with fledging typically complete by the end of July (IDFG 2012). At higher elevations, this may fluctuate with prey availability.

Vegetative communities that provide source habitat conditions include PVGs 2, 3, 5, and 6 in the medium and large tree size classes and moderate canopy cover class (Nutt et al. 2010). These PVGs are most likely to have the habitat types that develop late seral stages of open forest with stands dominated by ponderosa pine or Douglas-fir, or co-dominated by both. Historical fire regimes in these PVGs include nonlethal and mixed (Forest Service 2003a, Appendix A). Snags are a special habitat feature for flammulated owls and provide nesting sites.

Flammulated owl monitoring transects exist in the SGP area and the species has been documented and breeds in the wildlife analysis area. Approximately 18,321 acres of modeled source habitat is present (**Table 3.13-13**; **Figure 3.13-13**). The highest acreages of modeled habitat occur in the following subwatersheds: Upper Big Creek, Duck Creek – Cascade Reservoir, Curtis Creek, Goat Creek – South Fork Salmon River, and Poison Creek – North Fork Payette River.

Table 3.13-13 Flammulated Owl Modeled Summer Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 2 (acres)	PVG 3 (acres)	PVG 5 (acres)	PVG 6 (acres)	Totals (acres)
Medium / Medium	2,133	74	691	1,878	4,775
Medium / Medium-High	2,495	69	1,261	3,927	7,752
Large / Medium	938	16	102	114	1,169
Large / Medium-High	506	6	185	232	928
Very Large[1] / Medium	3	0	1	0	4
Total NFS Lands	**6,075**	**164**	**2,240**	**6,150**	**14,629**
Medium / Medium	582	58	293	476	1,410
Medium / Medium-High	434	37	523	1,000	1,994
Large / Medium	120	0	44	37	201
Large / Medium-High	27	2	24	35	88
Total Non-NFS Lands	**1,162**	**98**	**884**	**1,548**	**3,692**
Total All Lands	**7,237**	**262**	**3,124**	**7,698**	**18,321**

Table Source: Forest Service 2020
Table Notes:
1 Very large tree size class highly limited in analysis area.

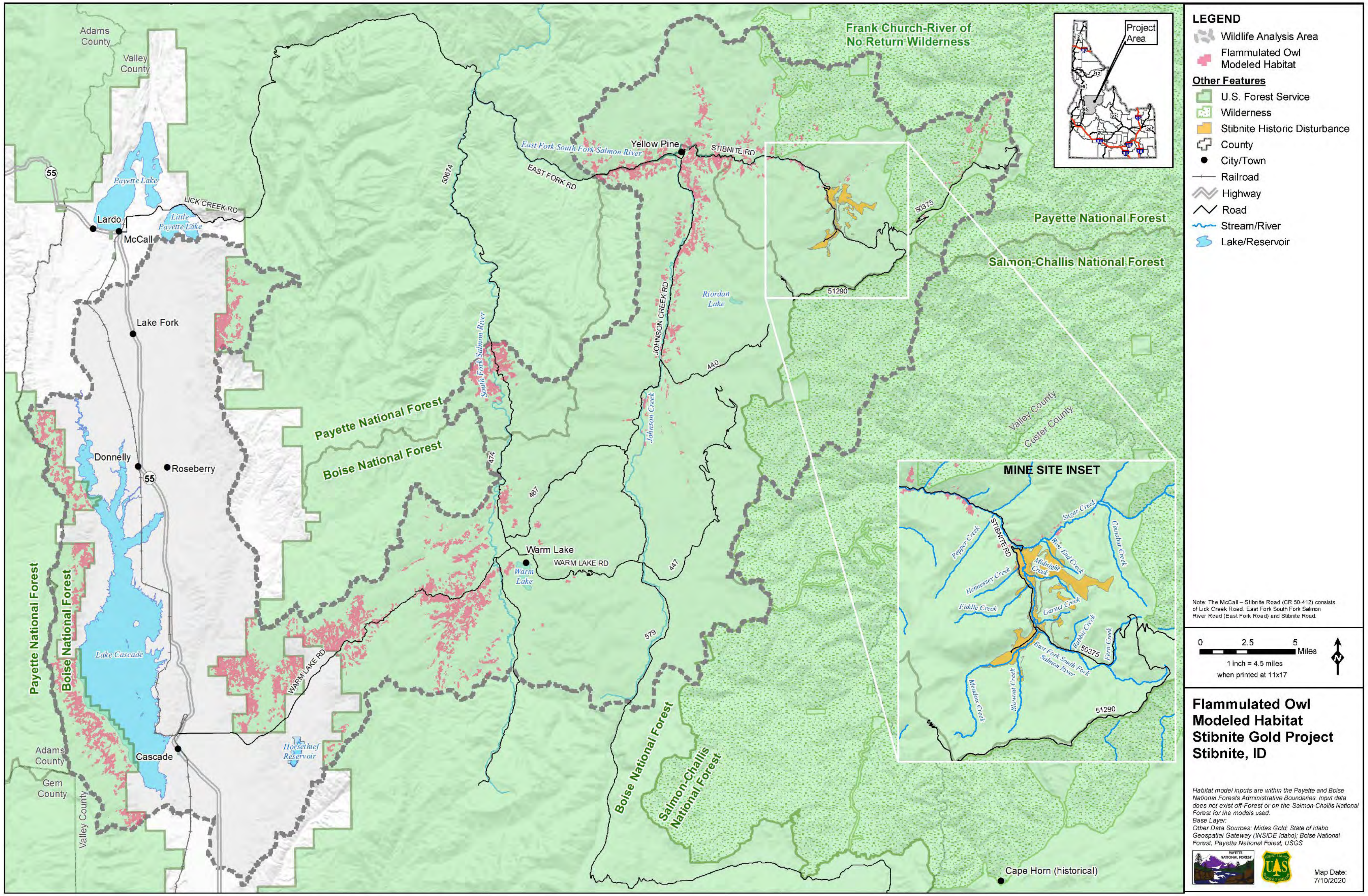

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-13 Flammulated Owl Modeled Habitat

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Great gray owl. Great gray owl is a Region 4 Sensitive species and Idaho SGCN. Great gray owl source habitat includes old forests (multi- and single-story); unharvested, young, multi-story forests; and stand-initiation stages of subalpine and montane forests, including Engelmann spruce, spruce-subalpine fir, and riparian woodlands (Wisdom et al. 2000). The habitat components considered most important for great gray owl are suitable nesting sites in mature or older forest, with adjacent suitable foraging areas in non-stocked and seedling forests, meadows, and open riparian habitats adjacent to extensive meadows. Large diameter trees or snags are special habitat features for the great gray owl. Great gray owls often use the nests of other raptor species in large, broken-topped trees and are known to nest within northern goshawk nest stands. Though associated with mature to old-growth conifer forests, they forage in open areas within 2 miles of nests, including meadows, bogs, and peatlands (Ulev 2007). Due to their close association with snow cover, breeding season typically lasts from late February to late May on the PNF and BNF.

Vegetative communities on the PNF and BNF capable of providing great gray owl source habitat conditions include PVGs 3, 6, 7, 8, 9, 10, and 11. Many of these PVGs historically had mixed and lethal fire regimes, which can create both open and forested habitats being used by the owls. The model likely greatly overestimates the amount of source habitat because it does not account for forest stands proximate to open meadows or other foraging habitats. Due to their specific habitat requirements, including this habitat mix, great gray owls are expected to be uncommon within the analysis area.

Great grays have limited Forest Service documentation in the wildlife analysis area. Strobilis Environmental (2017) indicates that great gray owls have been documented in the Warm Lake and Landmark LAUs. HDR Inc. (HDR) conducted broadcast surveys at two sites within the wildlife analysis area and no individual owls were detected (HDR 2017a,b). Approximately 75,932 acres of modeled source habitat is present (**Table 3.13-14**; **Figure 3.13-14**). The highest acreages of modeled source habitat occur in the following subwatersheds: Upper Big Creek, Curtis Creek, Ditch Creek – Johnson Creek, Burntlog Creek, and Trapper Creek – Johnson Creek.

Table 3.13-14 Current Condition of Great Gray Owl Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 3 (acres)	PVG 6 (acres)	PVG 7 (acres)	PVG 8 (acres)	PVG 9 (acres)	PVG 10 (acres)	PVG 11 (acres)	Totals (acres)
Medium / Low	122	183	5,263	275	185	2,685	1,485	10,197
Medium / Low-Medium	111	0	5,289	115	133	3,660	609	9,917
Medium / Medium	74	23	5,284	297	190	3,552	349	9,768
Medium / Medium-High	69	508	9,680	804	699	7,064	465	19,289
Medium / High	23	104	4,236	303	99	1,789	156	6,710
Large / Low	6	27	3,892	29	26	2,507	378	6,866
Large / Low-Medium	15	5	1,017	4	16	616	40	1,714
Large / Medium	16	2	1,638	27	24	1,286	39	3,031
Large / Medium-High	6	69	1,495	133	69	721	40	2,533
Large / High	2	10	1,007	25	7	327	26	1,404
Very Large[1] / Low	0	0	5	0	0	15	0	20
Very Large / Low-Medium	0	0	3	0	0	4	0	6
Very Large / Medium	0	0	0	0	0	0	0	1
Total NFS Lands	**443**	**930**	**38,809**	**2,013**	**1,448**	**24,227**	**3,586**	**71,456**
Medium / Low	11	130	250	80	36	62	13	582
Medium / Low-Medium	36	0	479	13	0	33	0	562
Medium / Medium	58	7	393	1	0	17	0	477
Medium / Medium-High	37	567	835	500	110	252	14	2,314
Medium / High	1	66	48	23	1	48	1	187
Large / Low	0	0	162	0	0	14	6	181
Large / Low-Medium	6	0	43	0	0	0	0	49
Large / Medium	0	0	28	1	1	13	0	43
Large / Medium-High	2	16	21	4	3	3	0	48
Large / High	0	6	20	4	1	1	0	31
Total Non-NFS Lands	**153**	**792**	**9,796**	**625**	**152**	**443**	**34**	**11,994**
Total All Lands	**596**	**1,723**	**41,087**	**2,637**	**1,600**	**24,669**	**3,619**	**75,932**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

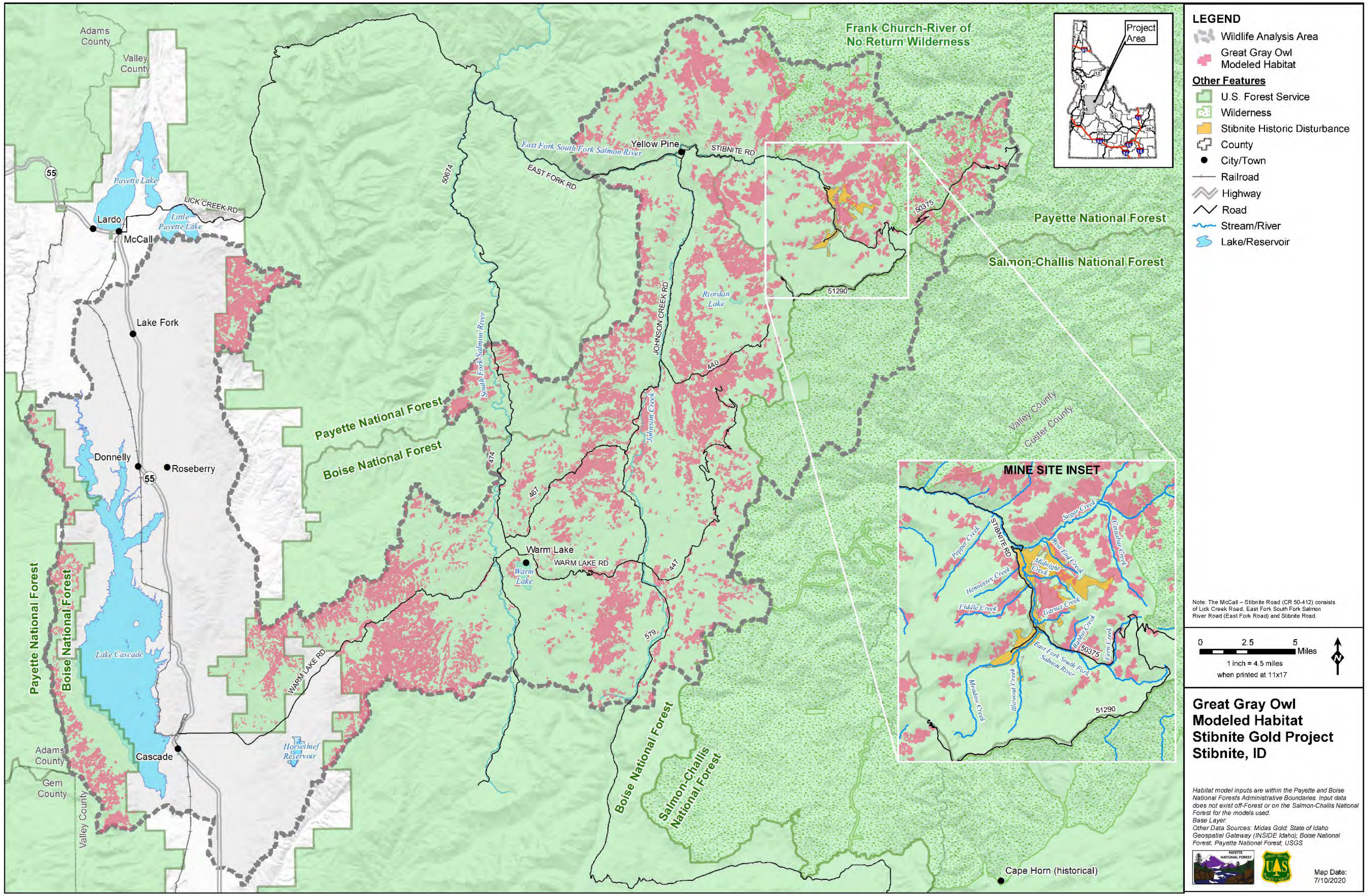

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-14 Great Gray Owl Modeled Habitat

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Northern goshawk. The northern goshawk is a Region 4 Sensitive species that occupies northern conifer forests. Northern goshawks use a variety of forest ages, structural conditions, and successional stages (Griffith 1993), and are associated with shrubland and grassland habitats. The home range for a goshawk pair is up to 6,000 acres (Griffith 1993). Nesting is typically from April through June and fledging is generally complete by the end of August.

Goshawks have been documented at low levels in the wildlife analysis area, specifically in the Burntlog and Stibnite LAUs (NRM 2018; Strobilus Environmental 2017); although there appears to be sufficient habitat for breeding, goshawks are expected to be uncommon. HDR conducted goshawk surveys in 2015 and 2017 in the proposed mine site area at the request of the Forest Service. No adult or juvenile goshawks were observed during broadcast acoustical surveys, and no evidence of nests, white wash (i.e., urine and feces), prey remains, or molted feathers were observed (HDR 2015, 2017b).

On both the PNF and BNF, source habitat for northern goshawks occurs in all PVGs except 1 and 11 in the medium and large tree size classes and moderate and high canopy cover class (Nutt et al. 2010). PVGs 2 through 9 are capable of developing multi-layered, mature, and late seral stands with a dense canopy. For some PVGs, such as PVG 6, these conditions occur under historical fire regimes, while other PVGs, such as PVGs 2 and 5, develop these conditions from fire suppression and altered fire regimes.

Approximately 45,758 acres of modeled source habitat is present in the wildlife analysis area (**Table 3.13-15**; **Figure 3.13-15**). The highest acreages of modeled source habitat occur in the following subwatersheds: Curtis Creek, Upper Big Creek, Duck Creek – Cascade Reservoir, Boulder Creek, and No Mans Creek – East Fork South Fork Salmon River.

Table 3.13-15 Northern Goshawk Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 2 (acres)	PVG 3 (acres)	PVG 4 (acres)	PVG 5 (acres)	PVG 6 (acres)	PVG 7 (acres)	PVG 8 (acres)	PVG 9 (acres)	PVG 10 (acres)	Totals (acres)
Medium / Medium-High	0	69	4,400	0	3,927	9,680	804	699	7,064	26,645
Medium / High	0	23	1,383	0	1,089	4,236	303	99	1,789	8,923
Large / Medium-High	506	6	803	185	232	1,495	133	69	721	4,150
Large / High	299	2	573	29	120	1,007	25	7	327	2,389
Very Large[1] / High	1	0	0	0	0	0	0	0	0	1
Total NFS Lands	**806**	**100**	**7,160**	**214**	**5,369**	**16,418**	**1,265**	**874**	**9,902**	**42,107**
Medium / Medium-High	0	37	446	0	1,000	835	500	110	252	3,180
Medium / High	0	1	17	0	170	48	23	1	48	307
Large / Medium-High	27	2	12	24	35	21	4	3	3	130
Large / High	0	0	0	0	8	20	4	1	1	34
Total Non-NFS Lands	**27**	**41**	**475**	**24**	**1,212**	**923**	**531**	**114**	**304**	**3,651**
Total All Lands	**832**	**140**	**7,635**	**238**	**6,581**	**17,342**	**1,796**	**988**	**10,206**	**45,758**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

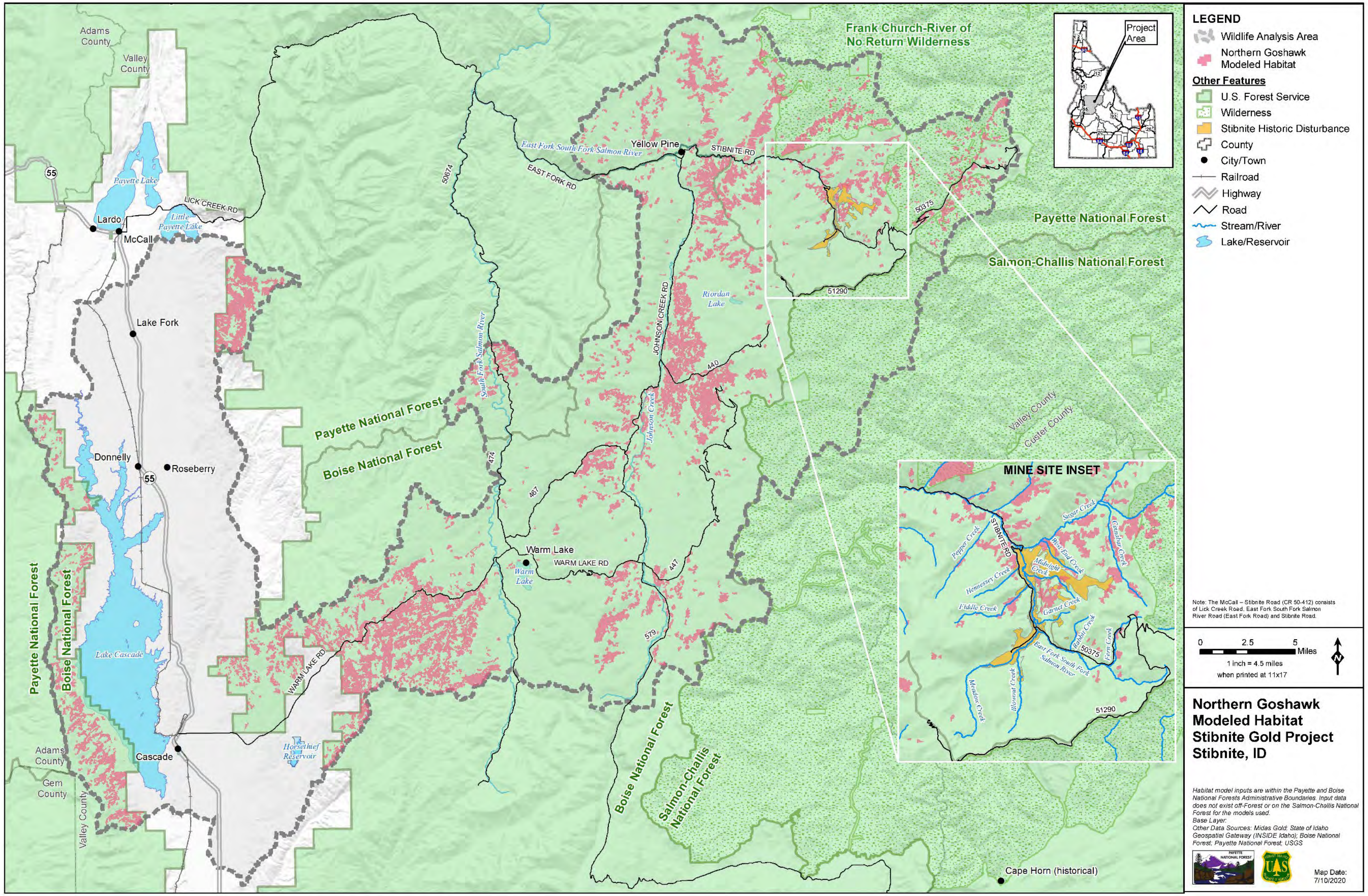

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-15 Northern Goshawk Modeled Habitat

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Pileated woodpecker. The pileated woodpecker is a PNF/BNF MIS and focal species. Pileated woodpeckers serve a variety of functional roles within the community and are associated with habitat elements used by other species in this family. Pileated woodpeckers occupy dense deciduous, coniferous, or mixed forests; open woodlands; second growth forests; and parks and wooded residential areas of towns (**Appendix K-2**). The species prefers habitats with tall closed canopies and high basal areas. General characteristics of habitat provide opportunities for nesting, roosting, and foraging and include the presence of large diameter trees and snags, multiple canopy layers, decaying wood on the forest floor, and a somewhat moist environment that promotes fungal decay, and ant, termite, and beetle populations to forage upon (**Appendix K-2**). Source habitats for pileated woodpeckers are typically late-seral stages of subalpine and montane community types. Home ranges average 1,006 acres (**Appendix K-2**).

On the PNF and BNF, vegetative communities that may provide source habitat conditions include PVGs 2, 3, 5, 6, 8, and 9 in the large tree size classes and moderate and high canopy cover class (Nutt et al. 2010). Some PVGs are capable of providing source habitat conditions under historical fire regimes while others do so because of altered fire regimes (i.e., PVGs 2 and 5). Special habitat features for pileated woodpecker include large diameter (>21 inches dbh) snags and hollow live trees for nesting and roosting, and large standing dead and downed trees for foraging. Some of these special habitat features are not well represented by the model. The very large tree size class is very limited in the analysis area.

Approximately 1,722 acres of modeled source habitat is present in the wildlife analysis area (**Table 3.13-16**; **Figure 3.13-16**). The highest acreages of modeled source habitat occur in the following subwatersheds: Upper Monumental Creek, Duck Creek – Cascade Reservoir, Goat Creek – South Fork Salmon River, Profile Creek, and No Man’s Creek – East Fork South Fork Salmon River.

Table 3.13-16 Pileated Woodpecker Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 2 (acres)	PVG 3 (acres)	PVG 5 (acres)	PVG 6 (acres)	PVG 8 (acres)	PVG 9 (acres)	Totals (acres)
Large / Medium-High	506	6	185	232	133	69	1,130
Large / High	299	2	29	120	25	7	483
Very Large[1] / High	1	0	0	0	0	0	1
Total NFS Lands	**806**	**8**	**214**	**352**	**158**	**76**	**1,614**
Large / Medium-High	27	2	24	35	4	3	95
Large / High	0	0	0	8	4	1	13
Total Non-NFS Lands	**27**	**2**	**24**	**43**	**8**	**3**	108
Total All Lands	**832**	**10**	**238**	**395**	**166**	**80**	**1,722**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

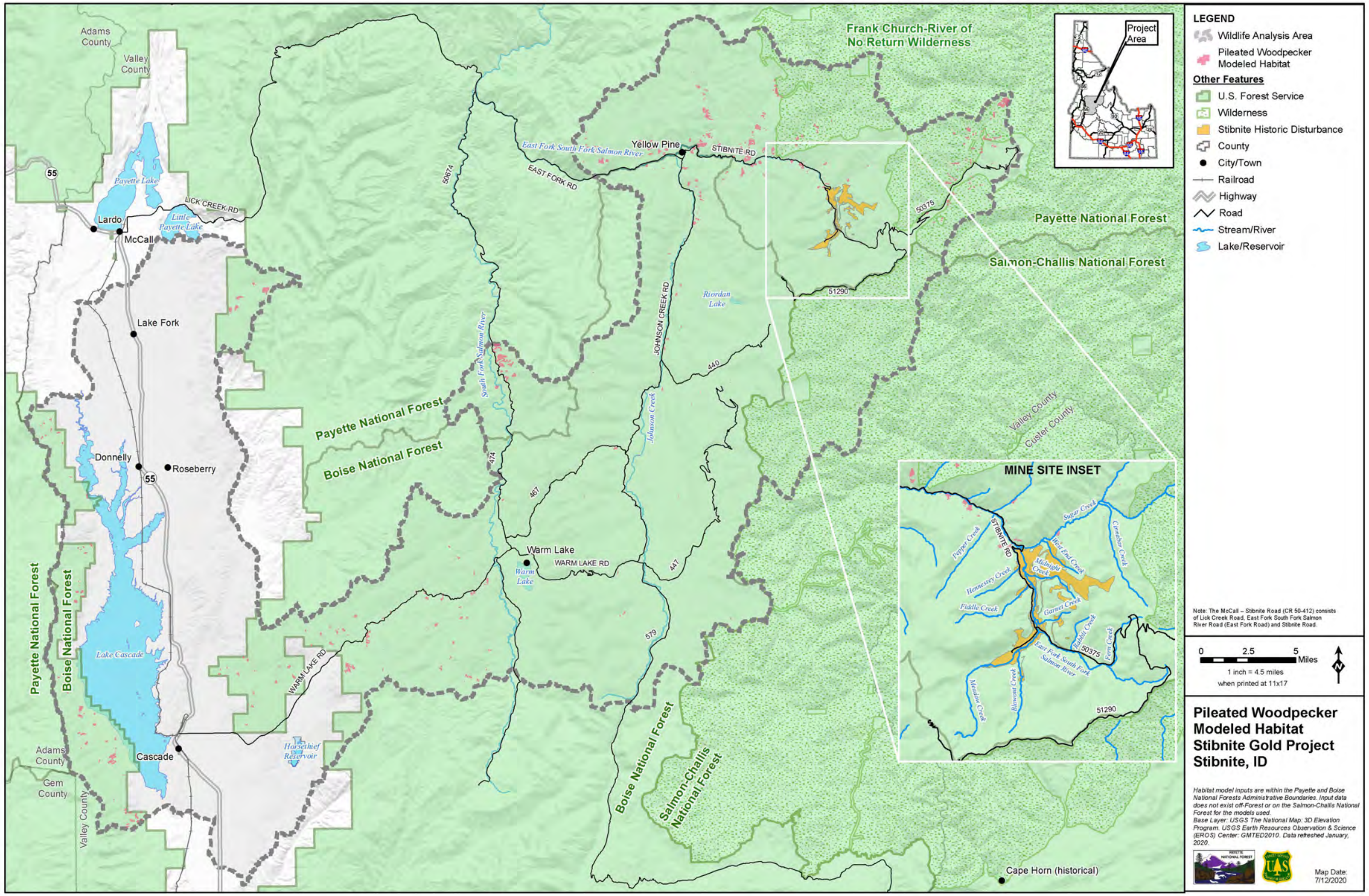

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-16 Pileated Woodpecker Modeled Habitat

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Silver-haired bat. Silver-haired bat is a Region 4 Sensitive species and Idaho SGCN (Tier 2) associated with primarily forested areas adjacent to lakes, ponds, and streams, including areas with human disturbance. They are generally migrant over the major part of their range. Summer roosts are in conifer / deciduous tree foliage, cavities, loose bark, and sometimes in buildings. Day roost trees are usually characterized as large (>21 inches dbh), dead or live with some defect, with loose bark and cracks. Winter habitat includes mines, caves, rock crevices, under tree bark and hollow trees / snags (**Appendix K-2**).

Source habitat for resident silver-haired bats is in forested and woodland areas, generally late seral stages of subalpine, montane, lower montane, and riparian woodland community groups. Modeling of source habitat for this species, which consists of both foraging and roosting habitat, utilizes Seedling (<4.5 feet tall), Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes. Literature also supports use of forested stands in the Low (10 to 19 percent), Low-Medium (20 to 29 percent), and Medium (30 to 44 percent) tree canopy cover classes for preferred PVGs within their HRV.

Silver-haired bats have been documented on Forest Service lands in the wildlife analysis area and in the FCRNRW (IDFG 2014; 2013). Approximately 57,719 acres of modeled source habitat is present in the wildlife analysis area (**Table 3.13-17**; **Figure 3.13-17**). The highest acreages of modeled source habitat occur in the following subwatersheds: Upper Big Creek, Curtis Creek, Six-bit Creek – South Fork Salmon River, Loosum Creek – East Fork South Fork Salmon River, and Porcupine Creek – Johnson Creek.

Table 3.13-17 Silver-haired Bat Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 1 (acres)	PVG 2 (acres)	PVG 3 (acres)	PVG 4 (acres)	PVG 5 (acres)	PVG 6 (acres)	PVG 7 (acres)	Totals (acres)
Seedling / Low	7	6	0	12	3	0	22	51
Seedling / Low-Medium	0	0	0	1	0	0	0	1
Medium / Low	215	2,061	122	2,467	699	1,009	5,263	11,837
Medium / Low-Medium	92	1,457	111	2,544	700	1,485	5,289	11,676
Medium / Medium	224	2,133	74	2,861	691	1,878	5,288	13,148
Large / Low	1,238	2,022	6	1,333	186	94	3,892	8,771
Large / Low-Medium	138	368	15	420	75	131	1,017	2,164
Large / Medium	161	938	16	827	102	114	1,638	3,795
Very Large[1] / Low	0	8	0	13	4	4	5	34
Very Large / Low-Medium	0	5	0	4	2	10	3	25
Very Large / Medium	0	3	0	7	1	0	0	11
Total NFS Lands	**2,074**	**9,001**	**343**	**10,490**	**2,464**	**4,724**	**22,417**	**51,512**
Seedling / Low	0	0	0	1	0	0	1	2
Medium / Low	1	176	11	150	146	282	250	1,016
Medium / Low-Medium	5	594	36	486	305	428	479	2,333
Medium / Medium	6	582	58	382	293	476	393	2,191
Large / Low	2	23	0	19	3	3	162	211
Large / Low-Medium	1	51	6	56	14	24	43	196
Large / Medium	0	120	0	29	44	37	28	259
Total Non-NFS Lands	**15**	**1,546**	**112**	**1,123**	**806**	**1,249**	**1,356**	**6,207**
Total All Lands	**2,089**	**10,547**	**456**	**11,613**	**3,269**	**5,973**	**23,773**	**57,719**

Table Source: Forest Service 2020

Table Notes:

1 Very large tree size class highly limited in analysis area.

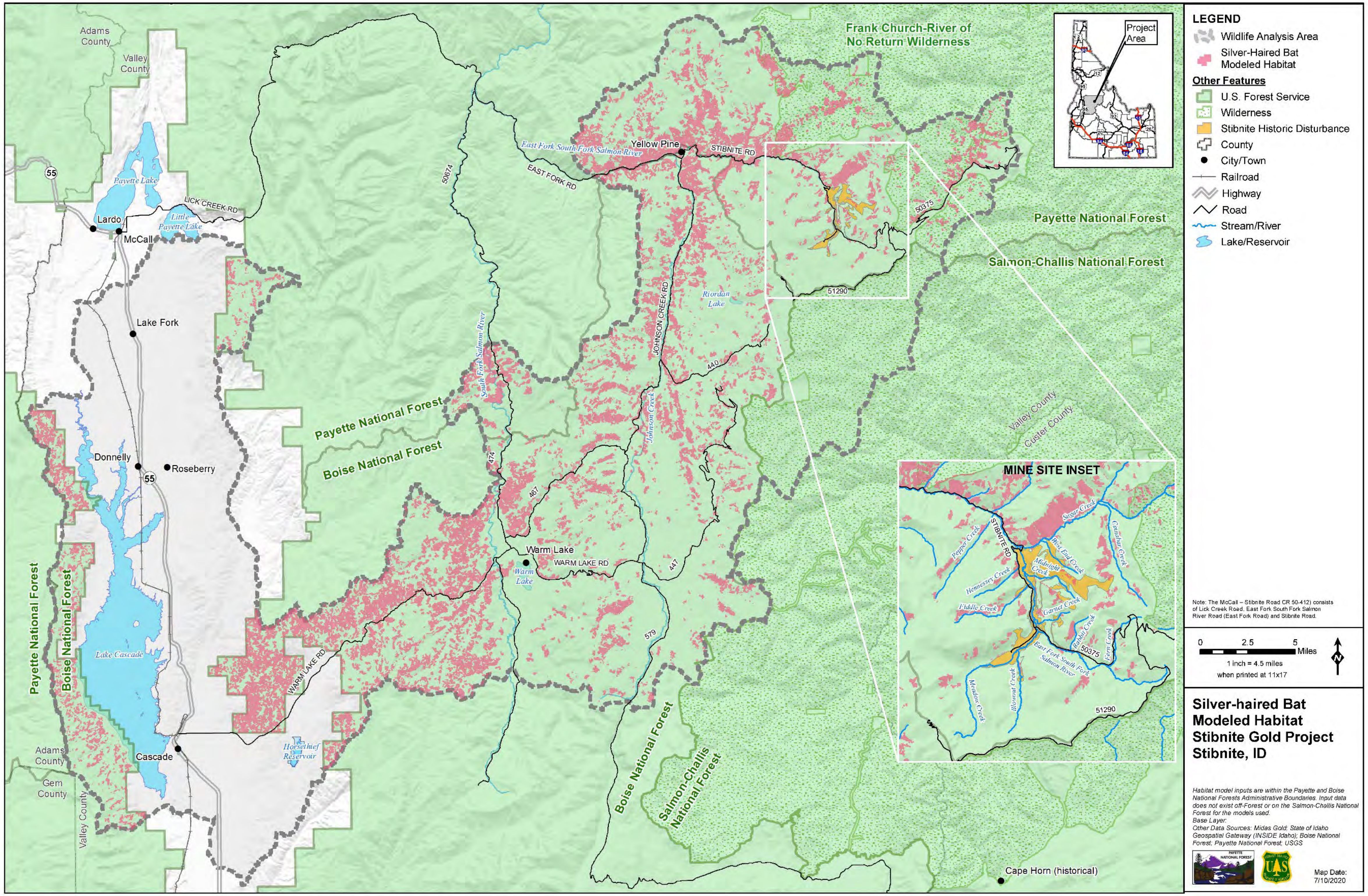

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-17 Silver-haired Bat Modeled Habitat

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3.13.3.3.3 HABITAT FAMILY 3 – FOREST MOSAIC

Species within this family tend to be habitat generalists in montane forests. Most species also use subalpine forests, lower montane forests, or riparian woodlands as source habitats. A few species use upland shrub and upland herb communities. Source habitat occurs across all PVGs and structural stages. Three TEPC or Sensitive wildlife species are within Family 3: Canada lynx (discussed in TEPC section), wolverine (discussed in TEPC section), and mountain quail.

Mountain quail. Mountain quail is a Region 4 sensitive species and an Idaho SGCN that is closely associated with riparian habitats (Forest Service 2012). Wisdom et al. (2000) describes forest habitat associations for this species as all forested vegetation stages, except stem exclusion (i.e., forest stage where young trees are rapidly competing and growing densely) in Interior Douglas-fir, Interior ponderosa pine, and Western larch cover types. In Idaho, Herman et al. (**Appendix K-2**) describes use of conifer shrub or riparian shrub communities that have a forested component.

On the BNF and PNF, vegetative communities that may provide source habitat conditions for mountain quail include PVGs 1, 2, 4, 5, 7, and 11 (Nutt et al. 2010). Historical fire regimes are nonlethal in low elevation types (PVGs 1, 2, and 5) and “mixed1” or “mixed2” in other PVGs. Riparian shrubland is a special habitat feature. In the Interior Columbia Basin, mountain quail are usually found within 100 to 200 meters (328 to 656 feet) of a water source (**Appendix K-2**). The source habitat model utilizes Seedling (4.5 feet tall), Sapling (0.1 to 4.9 inches dbh), Small (5 to 9.9 inches dbh, Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes and selected forested stands in the Low (11 to 19 percent) and Low-Medium (20 to 29 percent) tree canopy cover classes.

Mountain quail are most often found in areas with high abundance of shrubs and the model also includes Very Low (10 to 20 percent) and Low (20 to 30 percent) canopy cover classes for the SHRUB EVT and Very Low (10 to 20 percent), Low (20 to 30 percent), and Moderate (30 to 40 percent) for the FOREST EVT to model non-forest source habitat.

Although approximately 72,681 acres of mountain quail modeled source habitat occurs in the wildlife analysis area (**Table 3.13-18**; **Figure 3.13-18**), the nearest recorded observation is approximately 8 miles west of the northern portion of the analysis area (Forest Service 2017a) and species occurrence is expected to be rare. The highest acreages of modeled habitat are concentrated in the following subwatersheds: Upper Monumental Creek, Upper Big Creek, Loosum Creek – East Fork South Fork Salmon River, Ditch Creek – Johnson Creek, and Porcupine Creek – Johnson Creek.

Table 3.13-18 Mountain Quail Modeled Source Habitat (acres), by PVG and Tree Size / Canopy Cover Class, in the Analysis Area (NFS and Non-NFS Lands)

Tree Size / Canopy Cover Class	PVG 1 (acres)	PVG 2 (acres)	PVG 4 (acres)	PVG 5 (acres)	PVG 7 (acres)	PVG 11 (acres)	Non-Forest [1] (acres)	Totals (acres)
Non-Forest / Seedling / Sapling / Small	193	1,989	3,914	705	19,684	6,432	208	33,124
Medium / Low	215	2,061	2,467	699	5,263	1,485	0	12,191
Medium / Low-Medium	92	1,457	2,544	700	5,289	609	0	10,689
Large / Low	1,238	2,022	1,333	186	3,892	378	0	9,049
Large / Low-Medium	138	368	420	75	1,017	40	0	2,058
Very Large [2] / Low	0	8	13	4	5	0	0	30
Very Large / Low-Medium	0	5	4	2	3	0	0	15
Total NFS Lands	**1,875**	**7,910**	**10,695**	**2,371**	**35,153**	**8,943**	**208**	**67,156**
Non-Forest / Seedling / Sapling / Small	8	831	525	349	768	24	35	2,540
Medium / Low	1	176	150	146	250	13	0	736
Medium / Low-Medium	5	594	486	305	479	0	0	1,869
Large / Low	2	23	19	3	162	6	0	214
Large / Low-Medium	1	51	56	14	43	0	0	166
Total Non-NFS Lands	**16**	**1,675**	**1,236**	**817**	**1,702**	**44**	**35**	**5,525**
Total All Lands	**1,892**	**9,585**	**11,931**	**3,188**	**36,855**	**8,987**	**243**	**72,681**

Table Source: Forest Service 2020

Table Notes:

1 Non-forest acreages included in data for LANDFIRE ESP/EVT – Sagebrush and Shrub-Forest transition groups.

2 Very large tree size class highly limited in analysis area.

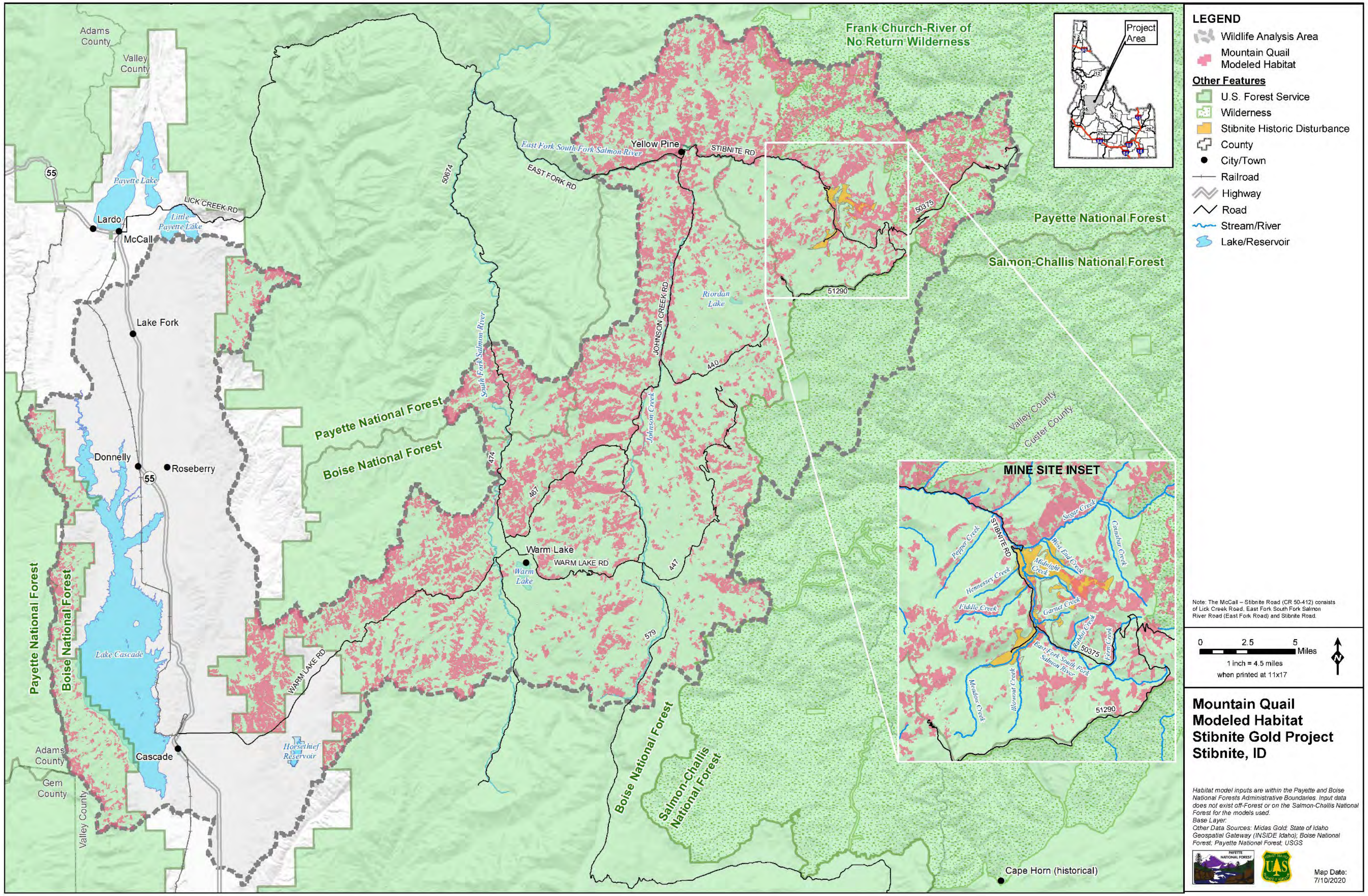

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-18 Mountain Quail Modeled Habitat

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3.13.3.3.4 HABITAT FAMILY 5 – FOREST AND RANGE MOSAIC

Family 5 species use a broad range of forest, woodlands, and rangelands as source habitat (Wisdom et al. 2000). Source habitats occur in all PVGs and structural types, as well as woodland and non-forested types. Human disturbance and altered fire regimes are primary factors affecting some species (Wisdom et al. 2000). Species associated with Family 5 potentially in the wildlife analysis are: gray wolf, peregrine falcon, Rocky Mountain bighorn sheep, and Rocky Mountain elk. Of the four species, current habitat modeling is only available for Rocky Mountain bighorn sheep. Remaining species are addressed qualitatively.

Gray wolf. Gray wolves are a Region 4 Sensitive species and are federally listed in several western states, excluding Idaho. Gray wolves in the northern Rocky Mountain states (i.e., Idaho, Montana, and parts of Oregon, Washington, and Utah) were delisted by the USFWS in May 2011. They are habitat generalists with large pack territories of up to 150 square miles (Snyder 1991). Their range is related to availability of prey species, including deer, elk, and, less commonly, moose, bighorn sheep, and domestic stock. Gray wolves are well documented in the wildlife analysis area. NRM WILDLIFE records verify occupancy in and around the wildlife analysis area and several packs are known to occur in the FCRNRWA. Garcia and Associates observed tracks during a 2013 winter field study (Forest Service 2017a; Garcia and Associates 2013; Strobilus Environmental 2017). Gray wolves have been observed in the mine site, specifically at the proposed tailings storage facility (in June 1998), main ore processing area (May 2000), and Yellow Pine pit (June 1997) locations. Midas Gold Idaho, Inc. staff and consultants have observed gray wolves multiple times during exploration activities in the analysis area (Strobilus Environmental 2017).

Peregrine falcon. Peregrine falcons are a Region 4 Sensitive species. Peregrines are cliff nesters, utilizing cliffs from 30 to 400 meters (98 to 1,312 feet) high. Habitat surrounding the cliffs may be variable, ranging from old forests to second growth and sagebrush steppe environments. Common features of nesting habitat include close proximity (1,312 to 2,953 feet) to water, abundant avian prey, and lack of human disturbance during the breeding season (Pagel 1995). Although greater distances may be traveled, peregrines usually hunt within 10 miles of their nests with 80 percent of foraging occurring within 1 mile.

Peregrines were once listed as endangered under the ESA, but were removed from the list in 1999. Pagel (1995) reviewed the status of peregrines in the Columbia River Basin. Major and minor potential threats to peregrines were identified. Major threats were described as continuing concerns to the short- and long-term viability of the population. These included pesticide contamination and anthropogenic (i.e., human) disturbance near nest sites. Weather, predation, competition, disease, accidents, falconry, shooting, and prey population declines were identified as minor threats.

On the PNF and BNF, vegetative communities that could provide source habitat conditions include all forest and non-forest vegetation types. Source habitat is typically located within 10 miles of suitable nesting cliffs.

Peregrine falcons have been documented within the wildlife analysis area and nesting has been verified along Johnson Creek and East Fork South Fork Salmon River since 2000 (NRM 2018). Breeding territories also are documented in the FCRNRW area.

Rocky Mountain bighorn sheep. Rocky Mountain bighorn sheep are a Region 4 Sensitive species and Idaho SGCN (Tier 2). Human settlement of Idaho in the mid-1800s increased harvest of bighorn sheep and introduced domestic sheep, resulting in a major loss of the species. Disease transmission from domestic sheep to bighorn sheep has resulted in substantial die-offs dating back to the 1870s in the Salmon River Mountains (Smith 1954). Current estimates place bighorn sheep numbers at 10 percent or less of the historic population levels.

Bighorn sheep occupy rugged canyons, foothills, and mountainous terrain at elevations ranging from 1,450 to 10,500 feet and slopes of 45 percent or greater. Key habitat features include steep, rugged escape terrain, such as cliffs and rock slides; grasses and forbs for forage; and a limited amount of tall vegetation. Wisdom et al. (2000) describe source habitats for bighorn sheep in alpine, subalpine, upland shrubland, and upland herbland community groups. Alpine and subalpine community groups are primarily summer range and upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000).

NRM WILDLIFE has a record of one bighorn sheep on the eastern border of the Stibnite LAU (Forest Service 2017a). They are known to occur in the FCRNRW area, which includes lambing areas for the Big Creek herd and collaring data from the Forest Service. The IDFG (2017b) estimated the bighorn sheep population in the Middle Fork Salmon River Population Management Unit to be about 477 individuals in 2017, which was a decrease from survey estimates in 2004, 2006, and 2009. In addition, one bighorn sheep was observed approximately 6 miles northeast of the mine site (Strobilus Environmental 2017).

Bighorn sheep occurrence on the PNF and BNF is concentrated in areas with preferred habitat features such as Hell's Canyon National Recreation Area and the FCRNRW. Bighorn sheep have been documented in the wildlife analysis area. IDFG collaring data (2017b) verified several existing herds (Pinnacles, Big Creek, Monumental herds) and lambing areas within proximity to the SGP area. Approximately 59,092 acres of summer habitat and 10,186 acres of winter habitat is modeled within the wildlife analysis area, including some habitat on the Salmon-Challis National Forest.

On the PNF and BNF, PVGs 1, 2, 4, 5, 7, 9, 10, and 11 in all tree size classes and with a low canopy cover provide summer source habitat when this habitat is within 2 miles of rock, cliff, or talus slopes with greater than 27 percent gradient. Winter source habitat is composed of numerous sagebrush-dominated cover types when the canopy cover class is low and these cover types are within 2 miles of rock, cliff, or talus slopes with greater than 27 percent gradient. More information on the PNF bighorn sheep model is available in the PNF Bighorn Sheep Supplemental EIS Technical Report, Source Habitat Model (Forest Service 2010c). **Table 3.13-19** and **Figures 3.13-19** and **3.13-20** display modeled summer and winter bighorn sheep habitat occurring in the analysis area.

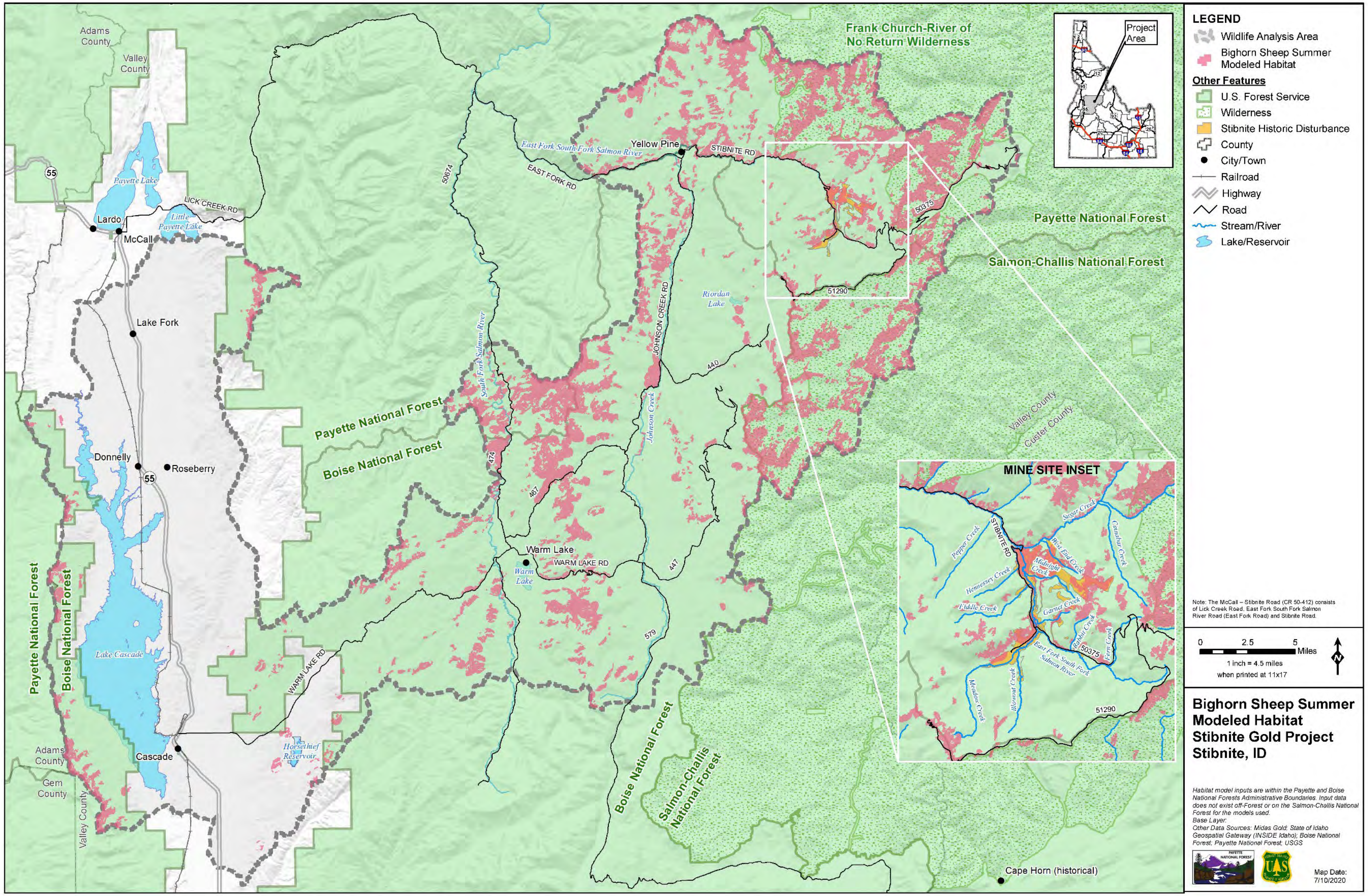

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-19 Bighorn Sheep Summer Modeled Habitat

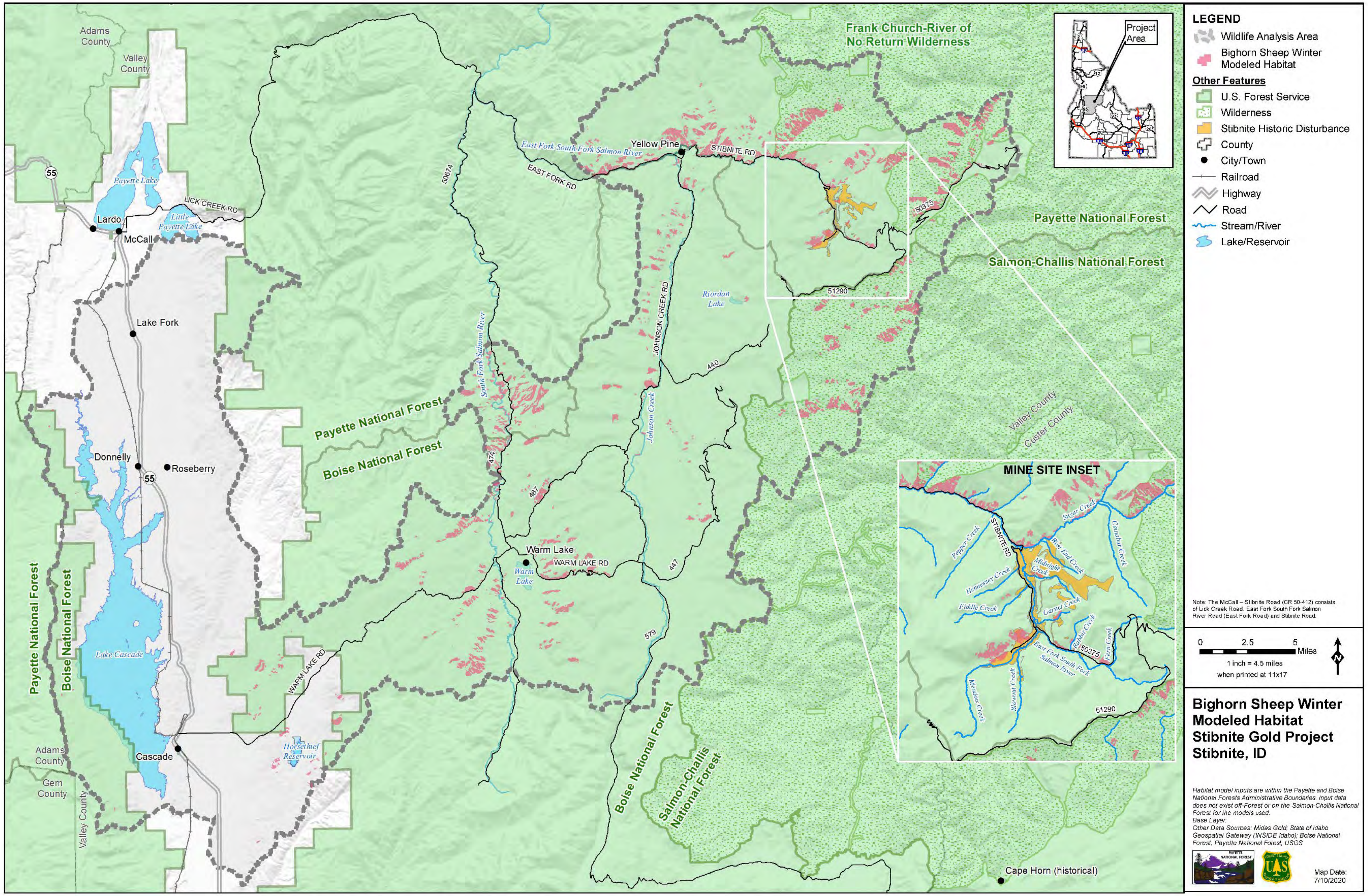

Figure Source: AECOM 2020; Forest Service 2020

Figure 3.13-20 **Bighorn Sheep Winter Modeled Habitat**

Table 3.13-19 Rocky Mountain Bighorn Sheep Modeled Summer and Winter Source Habitat (acres) in the Analysis Area (NFS and Non-NFS Lands)

Habitat	Total (acres)
Summer	
Non-NFS Lands	1,250
NFS Lands	57,842
Total All Lands	**59,092**
Winter	
Non-NFS Lands	276
NFS Lands	9,910
Total All Lands	**10,186**

Table Source: Forest Service 2020

3.13.3.3.5 Habitat Family 7 – Forests, Woodlands, and Sagebrush

Species in Family 7 use a complex pattern of forest, woodlands, and sagebrush cover types (Wisdom et al. 2000). A distinguishing feature of the family is that most species have specialized requirements for nesting and roosting, which often limits population size and distribution. Two Region 4 Sensitive wildlife species are members of Family 7: spotted bat and Townsend's big-eared bat. Due to the rarity of spotted bat, only Townsend's is addressed qualitatively in this analysis. Another Sensitive species, silver-haired bat (Family 2), which is believed to occur and has suitable habitat in the analysis area, is utilized as a proxy for other bat species.

Townsend's big-eared bat. Townsend's big-eared bat is a Region 4 Sensitive species and Idaho SGCN (Tier 3), with suitable habitat within the wildlife analysis area. Ponderosa pine, Douglas fir, and grand fir stands are abundant in the analysis area and may be used as summer maternity roost sites. Townsend's big-eared bats also will readily use underground mine workings and adits for daytime roosting (Gruver and Keinath 2006). There are no documented occurrences or records of Townsend's big-eared bat in the wildlife analysis area. The nearest observation is approximately 20 miles north near the Snowshoe Mine on Crooked Creek in Idaho County (in the company of multiple other bat species) according to the NRM WILDLIFE database (Forest Service 2017a). No Townsend's big-eared bat colonies have been recorded in Valley County as of 1999 (Idaho Conservation Effort 1999). They also have been documented using openings in cliff walls along the Snake River Canyon (Hells Canyon), about 65 miles west of the analysis area (Strobilus Environmental 2017).

3.13.3.3.6 Habitat Family 13 – Riverine Riparian and Wetland

Source habitat for species in Family 13 occurs in conjunction with riverine riparian and wetland areas. Some species within the family also use non-riverine riparian and wetland habitats. Adjacent forests and woodlands provide nesting sites for some species. Three TEPC or Sensitive wildlife species are members of Family 13: bald eagle, Columbia spotted frog, and yellow-billed cuckoo. Yellow-billed cuckoo is not analyzed in this EIS as described earlier in this section.

Bald eagle. The bald eagle is a Region 4 Sensitive species known to occur along riparian areas and in the vicinity of large waterbodies. The removal of the bald eagle from the Federal List of Endangered and Threatened Wildlife and Plants became effective August 9, 2007. However, the bald eagle is afforded some protections under the Bald and Golden Eagle Protection Act and the MBTA.

Two key habitats have been identified for bald eagles: nesting territory and wintering habitat. Nesting territories are typically associated with large rivers, lakes, reservoirs, or ponds that produce fish (Buehler 2000). Territories are used in successive years and may include more than one nest site. Bald eagles nest relatively close to water (1.25 miles) with suitable foraging opportunities (Buehler 2000). The majority of nest sites are located within one-half mile of a major stream or water body (USFWS 1986).

Wintering habitat also is typically associated with aquatic habitats with some open water for foraging (Buehler 2000). Winter habitat suitability is defined by food availability, the presence of roost sites that provide protection from inclement weather, and the absence of human disturbance (Buehler 2000). Winter food sources (e.g., fish, waterfowl, and ungulate carrion) and their availability varies across bald eagle winter range. Bald eagles scavenging on carcasses off highways are susceptible to motor-vehicle impact injuries. Bald eagles will tolerate some level of human activity in areas of high prey availability.

Key features of source habitat for the bald eagle include available food resources and suitable sites for nesting and roosting. These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the bald eagle include: watershed condition, water quality, channel conditions and dynamics, and flow/hydrology.

In the wildlife analysis area, bald eagles have nested at Warm Lake since the early 2000s and they also forage in the lake, as well as in the South Fork Salmon River (nest site last documented in 2008), and in the Johnson Creek area.

Columbia spotted frog. Columbia spotted frogs are aquatic and typically occur in or near permanent bodies of water, such as lakes, ponds, slow-moving streams, and marshes (Gomez 1994). The frogs generally occur along the marshy edges of such sites where emergent vegetation (e.g., grasses, sedges, cattails) is fairly thick and where an ample amount of dead and decaying vegetation exists. Some occupied sites also may have a layer of algae or small vegetation (e.g., duckweed) on the surface of the water. During summer, they may travel away from breeding sites but are still typically associated with aquatic sites with vegetated margins (Gomez 1994). Given the elevation range of the species, occupied aquatic sites may be surrounded by a wide variety of terrestrial vegetation, including mixed coniferous and subalpine forests, grasslands, and shrub-steppe communities.

Patla and Keinath (2005) describe three seasonally occupied habitats: breeding, foraging, and over-wintering. Breeding sites are used for egg deposition and larval development. These sites consist of stagnant or slow-moving water with some shallow (3.9 to 7.9 inches deep) water available. Emergent vegetation (sedges) is usually present. Foraging habitat is used by all post-larval stages of frogs for prey acquisition. These sites can occur as ephemeral pools in forests and meadows; intermittent and perennial streams; edges of rivers, riparian zones, and lake margins; and marshes. Over-wintering sites provide wet, well-oxygenated habitat that is protected from freezing temperatures. While some sites may be suitable for all three habitats, in many areas, these sites are spatially separated, requiring frogs to migrate between sites within the course of a year.

Key features of source habitat for the Columbia spotted frog include the aquatic site itself, its banks and bank-side vegetation, and the conditions of the surrounding uplands. These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the Columbia spotted frog include: watershed condition, water quality, channel conditions and dynamics, and flow/hydrology. No special habitat features have been identified for the Columbia spotted frog.

Individuals have been observed by the Forest Service in the riparian analysis area (Forest Service 2017a), and they were incidentally noted along the East Fork South Fork Salmon River near the mine site during raptor surveys in spring and summer of 2017 (HDR 2017b). They also may occur in other potentially suitable habitat in the riparian analysis area, such as forested areas adjacent to wetlands which may be used as winter hibernacula.

3.13.3.4 Idaho Species of Greatest Conservation Need

In addition to the PNF and BNF sensitive species, SGCN identified for the State of Idaho that may occur in the SGP area also are considered. The SGCN in the Idaho Batholith Ecoregion are discussed in this section (IDFG 2017a,c). Several species have already been assessed as TEPC species and focal species (including Forest Service Region 4 Sensitive and MIS) or are described in the migratory bird species sections (Section 3.13.3.6). The species not described elsewhere are listed in **Table 3.13-20** and include: western toad (*Anaxyrus boreas*), western grebe (*Aechmophorus occidentalis*), Clark's grebe (*Aechmophorus clarkii*), sandhill crane (*Grus Canadensis/Antigone canadensis*), common nighthawk (*Chordeiles minor*), hoary bat (*Lasiurus cinereus*), little brown myotis (*Myotis lucifugus*), and hoary marmot (*Marmota caligata*).

Table 3.13-20 Species of Greatest Conservation Need

Common Name	Scientific Name	IDFG Identified Habitats	Species Occurs in Analysis Areas?
Western Toad	*Anaxyrus boreas*	Springs and Groundwater-Dependent Wetlands; Lakes, Ponds, and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat
Western Grebe	*Aechmophorus occidentalis*	Lakes, Ponds, and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat
Clark's Grebe	*Aechmophorus clarkii*	Lakes, Ponds, and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat
Sandhill Crane	*Grus canadensis*	Riverine–Riparian Forest and Shrubland; Springs and Groundwater-Dependent Wetlands; Lakes, Ponds and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat
Common Nighthawk	*Chordeiles minor*	Dry Lower Montane–Foothill Forest; Lower Montane–Foothill Grassland and Shrubland; Riverine–Riparian Forest and Shrubland	Potentially in wildlife analysis area based on presence of suitable habitat
Hoary Bat	*Lasiurus cinereus*	Dry Lower Montane–Foothill Forest; Subalpine–High Montane Conifer Forest; Lower Montane–Foothill Grassland and Shrubland; Riverine–Riparian Forest and Shrubland; Springs and Groundwater- Dependent Wetlands; Lakes, Ponds, and Reservoirs	Present in wildlife analysis area based on Forest Service surveys
Little Brown Myotis	*Myotis lucifugus*	Dry Lower Montane–Foothill Forest; Lower Montane–Foothill Grassland and Shrubland; Riverine–Riparian Forest and Shrubland; Springs and Groundwater-Dependent Wetlands; Lakes, Ponds, and Reservoirs	Present in wildlife analysis area based on Forest Service surveys
Hoary Marmot	*Marmota caligata*	Alpine and High Montane Scrub, Grassland and Barrens; Wolverine	Potentially in wildlife analysis area based on presence of suitable habitat

Table Source: IDFG 2017a; PNF/BNF Monitoring Data (Galloway 2019)

These SGCN were analyzed in different groups depending on the habitats they generally occupy.

General Habitats – SGCN analyzed in this group include common nighthawk, hoary bat, and little brown myotis. The general wildlife analysis area was used for these species given their occupancy across several different habitats.

Riparian Species – SGCN analyzed in this group include western toad, western grebe, Clark's grebe, and sandhill crane. The riparian analysis area was used for these species due to their habitat requirements.

Alpine Species – the only SGCN analyzed in this group is the hoary marmot. This species uses subalpine and alpine areas, which overlap much of the wolverine analysis area. While the marmot has a much smaller home range compared to the wolverine, the wolverine analysis area is used for this species because of the overlap in habitat types.

3.13.3.5 Big Game Species

Big game species (as defined by the PNF and BNF Forest Plans) that are expected to be present and have habitat in the wildlife analysis area include Rocky Mountain elk and mule deer (*Odocoileus hemionus*) (Forest Service 2003a, 2010b). These big game species have been recorded in the PNF and/or BNF and also in the wildlife analysis area (Strobilus Environmental 2017). The Atlas of Idaho's Wildlife shows habitat present in the wildlife analysis area for these two species (IDFG 1997).

Roadless areas, which are usually more prevalent on national forests and wilderness areas, are often used for wildlife migration corridors (Forest Service 2007). Big game species also may use these remote places for calving, escape cover, summer/winter ranges, or migrations between summer and winter ranges. While there are no corridors or transition habitat in the wildlife analysis area (Forest Service 2017c), wildlife, including big game species, do move through the area. Big game species can be legally hunted and are managed by the IDFG. The wildlife analysis area occurs in IDFG Big Game Management Units (BGMUs) 24, 25, 26, and 27. Additional information regarding Rocky Mountain elk and mule deer is provided below. See **Appendix K-3** for more information about big game species life histories and observations.

Rocky Mountain elk. Rocky Mountain elk are a priority species/big game species of special interest in the PNF and BNF, and are found in a variety of habitats. They are habitat generalists and have been repeatedly observed in and near the wildlife analysis area. The wildlife analysis area near the mine site includes elk winter habitat and predicted elk summer habitat, which could include calving areas.

Habitat use and distribution changes seasonally for this species and can be generalized by seasonal movements. During the winter, snow forces elk to move to lower elevation winter ranges. Winter ranges are often of mixed land ownership and include portions of the PNF and BNF, as well as other public and private lands. As snow recedes, elk follow the spring green-up back to mid- and high-elevation summer ranges located in the PNF (Forest Service 2017c).

IDFG monitors and manages elk at the zone level (i.e., aggregations of several BGMUs). The wildlife analysis area is located in BGMUs that are currently meeting the IDFG bull and cow elk population objectives (IDFG 2017d). BGMUs 24 and 25 are both located in the McCall Elk Zone (the portion of Valley County in the drainage of the South Fork Salmon River south of the Hall Creek drainage on the east side of the river, and south of the Bear Creek drainage on the west side of the river, except that portion of the Secesh River drainage upstream from and including Paradise Creek drainage). BGMUs 26 and 27 are in the Middle Fork Elk Zone, and are northeast and southeast of the mine site, respectively. In surrounding elk zones that are below objectives, the IDFG is attempting to "increase the populations by reducing or eliminating cow harvest, adjusting bull harvest, and intensively managing predators to reduce the impacts of predation on those herds" (IDFG 2014b, 2017d). In a 2014 survey, IDFG (2018a) estimated a population of 816 individuals in BGMU 25, which was a 41 percent increase from the 2010 survey. No survey data were available for BGMU 24. As of the 2014 survey, the population was estimated to be 5,800 individuals in the McCall Elk Zone (Forest Service 2019).

Mule deer. Mule deer are a priority species/big game species of special interest in the PNF and BNF. Mule deer are habitat generalists and have been observed frequently in and near the wildlife analysis area. There is no designated mule deer winter range in the wildlife analysis area. Mule deer are best adapted to seral, transitional habitat types.

IDFG manages and monitors mule deer at the BGMU level. Portions of the wildlife analysis area are in legal mule deer hunting units, including BGMUs 24, 25, 26, and 27. The IDFG (2018b) estimated the mule deer population in the Weiser-McCall Population Management Unit 2 (which includes BGMU 24) to be 35,269 individuals in 2010. The population estimate for the Middle Fork Population Management Unit 3 (includes BGMU 25, 26, and 27) was 10,248 individuals in 2010 (IDFG 2018b). In 2017, the estimated abundance of mule deer was 1,279 individuals in BGMU 25, 1,319 individuals in BGMU 26, and 6,007 individuals in BGMU 27 (Forest Service 2019).

3.13.3.6 Migratory Bird Species, Bald and Golden Eagles

Migratory birds are protected under the MBTA, and bald and golden eagles also are protected under the Bald and Golden Eagle Protection Act. Most of the bird species discussed in the sections above are protected by the MBTA, with the exception of the mountain quail and dusky (blue) grouse. The Idaho PIF Idaho Bird Conservation Plan (Ritter 2000) was used to identify migratory bird species and habitats in the wildlife analysis area. The Idaho Bird Conservation Plan takes a habitat-based approach to conserving bird populations in Idaho and correlated priority bird species with four habitats of highest priority (Ritter 2000). Idaho PIF priority migratory bird species are shown in **Table 3.13-21**, including the high priority habitats they represent. Two of the four high priority habitats occur in the wildlife analysis area and are shown in **Table 3.13-21**.

Table 3.13-21 Migratory Bird Species and Priority Habitats in Wildlife Analysis Area

Idaho PIF Highest Priority Habitats	Idaho PIF Priority Migratory Bird Species	Idaho PIF Priority Migratory Bird Species in Wildlife Analysis Area
Dry Ponderosa Pine / Douglas-fir / Grand Fir Forests (Aspen can occur)	White-headed Woodpecker; Flammulated Owl	White-headed Woodpecker; Flammulated Owl
Riparian	Barrow's Goldeneye; Hooded Merganser; Blue Grouse; Mountain Quail; Black-chinned hummingbird; Calliope Hummingbird; Rufous Hummingbird; Willow Flycatcher; Dusky Flycatcher; Black-billed Magpie; American Dipper; Yellow Warbler; MacGillivray's Warbler	Blue Grouse; Mountain Quail; Calliope Hummingbird; Willow Flycatcher; American Dipper

Table Source: Ritter 2000

Migratory bird species known to occur in the wildlife analysis area through sightings or sign (e.g., nests, calls) include the golden eagle, Steller's jay, gray jay, Clark's nutcracker, common raven, and American dipper. Migratory bird species not documented, but assumed to occur due to suitable habitat, include the American robin, hermit thrush, Swainson's thrush, varied thrush, and red-tailed hawk.

The USFWS lists bird species of conservation concern for bird conservation regions across the U.S. (2008). These are species that have reduced populations or loss of essential habitat.

Table 3.13-22 lists these species for Region 10 of the USFWS (i.e., the Northern Rockies, including central and northern Idaho); all also are protected under the MBTA. The species in this section include species of conservation concern other than the special status species previously described (Section 3.13.3.3, Focal Species, including Region 4 Sensitive Species and Management Indicator Species).

Six of the 17 bird species of conservation concern listed in **Table 3.13-22** have a reasonable possibility of occurrence in the general wildlife analysis area: the calliope hummingbird, Lewis's woodpecker (discussed in Section 3.13.3.3, Focal Species, including Region 4 Sensitive Species and Management Indicator Species), olive-sided flycatcher, willow flycatcher, Cassin's finch, and Brewer's sparrow.

Table 3.13-22 Bird Species of Conservation Concern in Bird Conservation Region 10

Common Name	Scientific Name	Likelihood of Occurrence in the Wildlife Analysis Area
Brewer's sparrow	*Spizella breweri*	Potential – breeding suspected[1]
Calliope hummingbird	*Stellula calliope*	Potential – breeding has occurred[1]
Cassin's finch	*Carpodacus cassinii*	Potential, habitat present, not recorded in Valley County[1]
Lewis's woodpecker	*Melanerpes lewis*	Potential – [1], habitat present, limited documentation

Common Name	Scientific Name	Likelihood of Occurrence in the Wildlife Analysis Area
Olive-sided flycatcher	*Contopus cooperi*	Potential – habitat present, not recorded[1]
Willow flycatcher	*Empidonax traillii*	Potential – habitat present (wetlands)
Black rosy-finch	*Leucosticte atrata*	Low – not recorded in Valley County[1]
Ferruginous hawk	*Buteo regalis*	Low – habitat is grasslands, not recorded[1]
Loggerhead shrike	*Lanius ludovicianus*	Low – not recorded in Valley County[1], no habitat
McCown's longspur	*Calcarius mccownii*	Low – not recorded in Valley County[1]
Swainson's hawk	*Buteo swainsoni*	Low – not recorded in Valley County[1]
Williamson's sapsucker	*Sphyrapicus thyroideus*	Low – not recorded[1], habitat present
Black swift	*Cypseloides niger*	Negligible – no habitat (high waterfalls),not reported[1]
Long-billed curlew	*Numenius americanus*	Negligible – no habitat, no record[1]
Sage sparrow	*Amphispiza belli*	Negligible – no habitat, not reported[1]
Sage thrasher	*Oreoscoptes montanus*	Negligible – no habitat, not recorded[1]
Upland sandpiper	*Bartramia longicauda*	Negligible – no habitat, no record[1]

Table Source: USFWS 2008

Table Notes:

1 Idaho Bird Records Committee database (2018); other species listed in Atlas of Idaho's Wildlife (IDFG 1997).

3.13.3.7 Ambient Noise Levels

Tables 3.6-3 and **3.6-4** in Section 3.6.3.1, Noise-Sensitive Receptors, and Section 3.6.3.2, Baseline Ambient Noise Level Measurements, respectively, summarize the various baseline ambient noise levels in the SGP area. Ambient levels range from 34 to 64 decibels on the A-weighted scale across the 9 sites measured. It is important to note that these measurements are based on audibility to human hearing, and different groups of wildlife have different hearing level ranges. However, the East Fork South Fork Salmon River valley and areas near the proposed Burntlog Route had the lowest ambient sound levels while sites along existing roadways or near Cascade had the highest ambient sound levels. Overall, these sound levels indicate the area is generally quiet in most places, although wildlife do have exposure to louder existing roadways currently. Trucks/cars, off-highway vehicles, and snowmobiles currently utilize portions of the wildlife analysis area and exploration drilling and some limited activities currently occur near the mine site; wildlife are likely acclimated to this level of use and the noise associated with them. In more remote areas (e.g., FCRNRW near the proposed Burntlog Route), wildlife are likely not acclimated to such noise disturbances.

3.13.3.8 Baseline Air Quality

Section 3.3, Air Quality, describes the baseline conditions of the SGP area for air quality indicators.

The air quality in a given location is characterized by a number of properties that can be physically monitored and evaluated. The existing conditions that may be affected by the SGP include ambient air quality in comparison to the National Ambient Air Quality Standards, visibility as impacted by regional haze and visible plumes emitted from mine activities, and current rates of atmospheric deposition of mercury, nitrogen, and sulfur compounds. The description of the affected environment addresses these issues and several other parameters that pertain to regional air quality.

Table 3.3-2 indicates that monitored background levels used for air quality permitting were significantly below the ambient air standards. There are currently no permitted sources hazardous air pollutant emissions in the SGP area, and so the wildlife analysis area is likely not currently affected by them. Monitoring stations nearest to the SGP area indicate that both wet and dry nitrogen deposition show no clear trend or are trending higher, while sulfur deposition at sites nearby is variable. Atmospheric deposition of mercury is of particular concern where the potential exists for transfer to riparian areas and/or surface waters through precipitation and runoff. Section 3.3.3.4.2.3, Mercury Deposition Network, discusses that national mercury emissions from domestic anthropogenic sources have steadily declined due primarily to reductions in mercury emissions from fossil-fueled electric generation plants.

3.13.3.9 Analysis Area Disturbance

Existing disturbance within the analysis area includes historical mining-related disturbance and existing roads and trails. Historical mining-related disturbance is primarily within the SGP mine site area with an estimated 850 acres of existing disturbance within areas that would be encompassed by the SGP under all alternatives.

Existing roads within the analysis area which would be used for access to the SGP are discussed in Section 3.16, Access and Transportation. These roads include approximately 23 miles of NFS roads, and 75 miles of county roads. Only a portion of the 34-mile Warm Lake Road (CR 10-579) from Highway 55 to Warm Lake (23 miles) and the Stibnite Road portion of McCall-Stibnite Road (CR 10-412) (14 miles) are currently plowed for winter use. Currently 6 miles of Burnt Log Road (FR 447) are frequently groomed for over-snow vehicle use in the winter with another 3.8 miles infrequently groomed. A groomed over-snow vehicle route also runs along Warm Lake Road (CR 10-579) from Warm Lake to Landmark (11 miles). Another groomed over-snow vehicle route runs within the Johnson Creek Road (CR 10-413) travelway from Landmark to Wapiti Meadow Ranch for approximately 17 miles.

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3.14 TIMBER RESOURCES

3.14.1 Introduction and Scope of Analysis

This section defines and describes timber resources, which are the trees used to develop merchantable forest products. Forest products include timber products, such as lumber, paper, and firewood, and other “special forest products,” such as floral greenery, Christmas trees, medicinal herbs, fungi, and other natural products (U.S. Forest Service [Forest Service] 2017a). Timber resources in the Stibnite Gold Project (SGP) area consist of conifer tree species typically harvested to make forest products, including merchantable sawtimber-sized trees and sub-merchantable small trees. Merchantable timber cut during construction and operations may be sold as part of the SGP.

The analysis area for timber resources encompasses the entire area containing saleable timber resources in which disturbance from any action alternative would occur (i.e., the area proposed for direct removal of timber). The extent of the analysis area for timber resources is more focused than the entire SGP area because large portions of the SGP area do not contain timber resources. Areas lacking timber resources include areas that have experienced wildfire in the past 20 years, areas beneath the existing transmission line, and existing roads. The analysis area includes NFS, private, and state lands, and lands managed by the U.S. Bureau of Reclamation (BOR). NFS lands in the analysis area include portions of Payette National Forest (PNF) and portions of Boise National Forest (BNF). The analysis area for timber resources is shown on **Figure 3.14-1**. Some timber resource information is shown to extend beyond the boundaries of the analysis area in order to provide the reader with broader context for timber resources (i.e., the extent of private and state lands in the vicinity of the analysis area).

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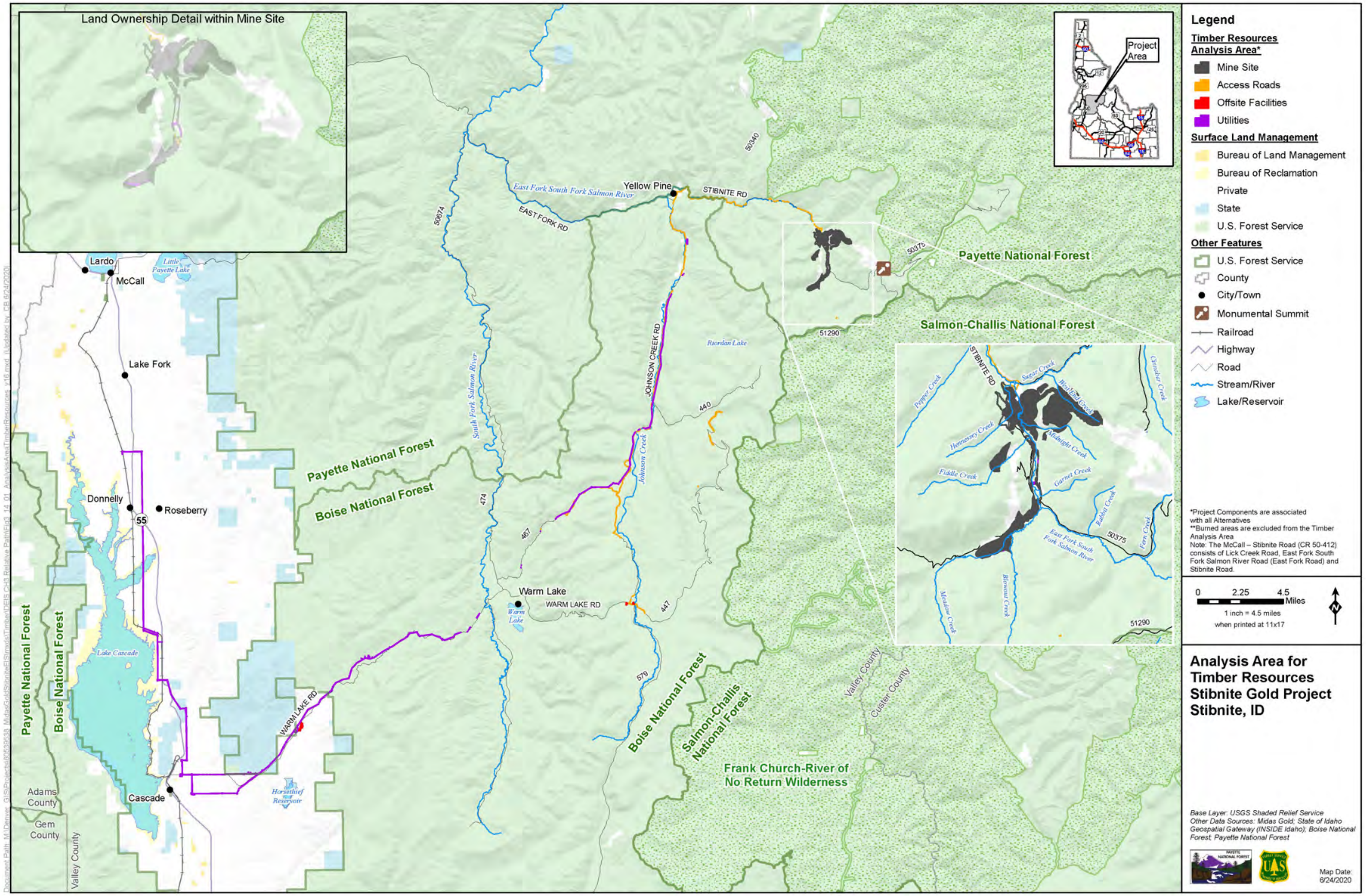

Figure Source: AECOM 2020

Figure 3.14-1 Analysis Area for Timber Resources

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3.14.2 Relevant Laws, Regulations, Policies, and Plans

3.14.2.1 Federal Regulations

3.14.2.1.1 NATIONAL FOREST MANAGEMENT ACT OF 1976

The National Forest Management Act (NFMA) of 1976 requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the NFS. The NFMA, as amended, and its implementing regulations under 36 Code of Federal Regulations (CFR) 219, consolidate and articulate Forest Service management responsibilities for lands and resources of the NFS. The land and resource management plans developed for the Payette and Boise National Forests under NFMA and its implementing regulations, their relevant timber resource provisions, and the SGP-specific plan amendments that may be required for the SGP are summarized below.

The NFMA provides that, in developing land and resource management plans, the Forest Service is to identify lands that are not suited for timber production, and assure that “except for salvage sales or sales to protect other multiple-use values, no timber harvest shall occur on such lands for a period of 10 years” (Suitability for Timber Production [16 United States Code {USC} 1604(k)]). NFMA and its implementing regulations include requirements to periodically re-verify the location of lands that are suited for timber production at least once every 10 years. Suited lands include forested lands outside withdrawn areas, such as designated wilderness areas, lands where reforestation can be assured, and lands where timber management activities can take place without causing irreversible resource damage to soil productivity or watershed conditions (16 USC 1600). Further, the NFMA states, “it is the policy of the Congress that all forested lands in the National Forest System shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans” (Reforestation [16 USC 1604(d)(1)]).

Lands suited for timber removal are evaluated to determine the range of Forest Service commercial timber sale harvest levels. The quantity of sawtimber that may be sold from the lands suited for timber on a forest is expressed as Allowable Sale Quantity (ASQ), which represents the average annual maximum volume that a forest may sell during each decade. Generally, all timber sold and harvested on suited lands during a decade must be counted against the ASQ to ensure that no more timber than allowed is removed from the suited lands. ASQ is measured in board feet and is estimated during harvest.

3.14.2.1.2 MULTIPLE USE ACT OF 1955

The Multiple Use Act of 1955 (69 Statute 367, 30 USC 612) states that mining claims patented prior to 1955 provide the owner with the rights under Forest Service Manual (FSM) 2800. There are no unpatented mining claims within the SGP area that predate the 1955 Act (Midas Gold Idaho, Inc. [Midas Gold] 2017). FSM 2800, Minerals and Geology, Chapter 2810 Mining Claims clarifies timber ownership rights on unpatented mining claims. Section 2813.13b–Claims Validated Subsequent to Act of 1955: Such claims which otherwise come under 30 USC 612 carry the same surface rights as those described in Section 2812, except for the following modifications:

1) Right to occupancy and use necessary for prospecting, mining, and processing, but not the exclusive right to the surface. Lands containing such claims are subject to the rights of the U.S. to manage and dispose of the vegetative resources, to manage other resources except locatable minerals, and to the right of the U.S., its permittees and licensees, to use so much of the surface area necessary for such purposes and for access to adjacent lands.
2) Right to cut timber on the claim for mining uses and for necessary clearing, except that timber cut in the process of necessary clearing cannot be sold by the claimant. The U.S. has the right to dispose of timber and other vegetative resources."

As per statutory authority provided to the Forest Service by the Multiple-use Mining Act of 1955, the Forest Service maintains rights to timber and other vegetation resources on all unpatented claims made after 1955. For timber harvest on these lands, the Claimant must coordinate with the Forest Timber Staff well in advance (ideally 1.5 to 2 years before the need to have the trees/timber removed from the subject area).

3.14.2.1.3 FOREST SERVICE HANDBOOKS AND MANUALS

The Forest Service has regulations and policies in Forest Service Handbooks (1909.60 and 2409.17) and FSMs (1920, 2430, 2470, 2471, and 2472) related to forest vegetation (Forest Service 2018). Cutting and removal of merchantable trees from NFS lands must be consistent with Forest Service directives, particularly FSM 2400, FSM 2800, and associated regulations (36 CFR 223.9, 36 CFR 223.14), and Forest Service Handbooks (2409.17 and 2409.26), both of which detail silvicultural activities permitted on government-owned land in the NFS.

3.14.2.2 State Regulations

Idaho Forest Practices Act. Administered by the Idaho Department of Lands (IDL), was enacted in 1974 to promote active forest management and ensure that the health of forest soil, water, vegetation, wildlife, and aquatic habitat is maintained during the growing and harvesting of forest trees in Idaho. The Idaho Forest Practices Act requires forest practices rules for state and private lands to protect, maintain, and enhance natural resources. To deliver timber to a mill, a timber harvest must file a "notification of Compliance" with the IDL, indicating an intention to follow the rules pertaining to the Idaho Forest Practices Act and follow fire hazard prevention measures of the Idaho Administrative Procedure Act/Idaho Administrative Code 20.02.01. Notable rules include requirements related to restocking, stream protection, logging operations, and soil protection (IDL 2018).

The Idaho Mined Land Reclamation Act (1971). The IDL also administers the Idaho Mined Land Reclamation Act, which requires reclamation of affected lands to a productive condition, including both lands affected by surface mining and the surface effects of underground mining. Incorporated into state statute under Title 47 “Mines and Mining,” Chapter 15 “Mined Land Reclamation,” the law includes procedures for reclamation that include plugging drill holes, and cross-ditching abandoned roads to avoid erosion (Section 47-1509); and for vegetation planting that specify an operator shall plant vegetation species on affected lands “that can be expected to result in vegetation comparable to the vegetation that was growing on the area occupied by the affected lands prior to exploration and mining operations” (Section 47-1510) (IDL 2019).

3.14.2.3 Valley County Regulations

The Valley County Comprehensive Plan. This comprehensive plan includes goals and objectives for the management and use of resources in Valley County (County), including natural resources such as timber. Goal I for “Economic Development” is “to promote and encourage activities which will maintain a strong, diversified economy.” Objectives under this Goal include “maintain the important role of the timber industry, tourism, outdoor recreation, mining and agriculture in the local economy and “Support ‘multiple use’ of public lands.” Goal IV for Natural Resources is “to maintain sustainable commercial harvesting and use of renewable timber land resources.” Goal V for Natural Resources is “to assure mining remains a viable element in Valley County’s economy.” Timber receipts as a source of revenue for the county has ceased, and declines in the timber industry have created a hardship for the county as timber receipts played an important role in funding county schools and roads (Valley County 2018).

3.14.2.4 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for timber and include various objectives, guidelines, and standards for this purpose.

To achieve the desired outcomes and conditions for both land stewardship and public service (i.e., desired conditions), the forest plans include management standards for timber resources at three scales: forest-wide level, more specific and focused Management Area (MA) level, and Management Prescription Category (MPC) level. **Appendix A** includes a list of Forest Plan standards that may require SGP-specific amendments as a result of approving the SGP, some of which apply to timber resources.

Generally, the desired conditions for timber resources are conditions in which a forest meets its timber sale program ASQ goals while managing lands suited for timber harvest in conformance with forest plan goals and strategies. Both forest plans evaluate available forestland within their respective boundaries to determine suitability for timber production and reflect the results of that evaluation by demarcating MPCs that allow timber harvest within areas containing suited acres. Despite the presence of timber species, if land is determined to be physically unsuited for timber production because of the inability to ensure adequate restocking or the potential for irreversible damage to soils or watersheds, timber production is removed as an intended use of that land. However, some exceptions for the removal of timber resources on unsuited lands are explicitly noted. In PNF Management Area 13, MPCs 3.1, 3.2, and 4.1c are identified as not suited for timber production; however, the PNF Forest Plan states that on these lands forest vegetation management actions, which include removal of timber resources, may be undertaken to "support the achievement of desired conditions or other resource objectives" consistent with the management goals laid out for them (Forest Service 2003).

The section "Forest Service Timber" (below), presents a detailed discussion of the MPCs that are found within the analysis area and the presence or absence of suitable timberland within each.

3.14.3 Existing Conditions

Timberland vegetation in central Idaho is dynamic, with changes occurring through both natural processes and timber management practices, and therefore the distribution and composition of timber resources also are dynamic. Natural disturbance processes include fires, windstorms, landslides, and insect and disease outbreaks. Management of timber forest vegetation includes timber harvest, planting, thinning, and other timber stand improvement activities, as well as prescribed burning. This section describes the existing conditions for timber resources in the analysis area, including timber and special forest products. This summary is based on best available vegetation and timber ownership information from the Forest Service and U.S. Geological Survey as of August 2019.

3.14.3.1 Timber Vegetation

As described in Section 3.10, Vegetation: General Vegetation Communities, Botanical Resources, and Non-native Plants, the Forest Service maps existing vegetation communities and updates their maps periodically; however, these data are only available for NFS land. The existing Forest Service vegetation mapping system, Vegetation Classification Mapping and Quantitative Inventory, reflects the forest-specific dominance type phases found on NFS land and was used to describe seral-stage timber resource composition in forested areas on NFS lands in the analysis area.

Private, state, and other federal lands in the analysis area, that are outside the boundaries of the PNF or BNF, are not characterized by Forest Service vegetation mapping, and therefore timber vegetation conditions were extrapolated from publicly available datasets and aerial imagery (AECOM 2020).

Existing vegetation communities in the analysis area include many developed and natural communities that generally are divided into broad lifeform-type categories. Fires, both natural and man-caused, have frequently occurred in the analysis area and surrounding forests, and much of the analysis area is currently mapped as burned herbaceous (grasses and forbs), burned sparsely vegetated, and burned forest shrubland. The lifeform type “Coniferous Forest” is defined as being dominated by conifer species and includes all the vegetation types that are dominated by timber species. In general, the existing Coniferous Forest vegetation communities are those typical of high mountain regions in Idaho and the inland northwestern U.S. The most common unburned, existing Coniferous Forest vegetation dominance types in the analysis area, which are used as a proxy for timberland vegetation in the absence of timber-specific mapping, are lodgepole pine forests, subalpine fir forests, Douglas-fir forests, Ponderosa pine forests, and Engelmann spruce forests (Forest Service 2014a,b, 2016, 2017b).[1]

Timberland vegetation communities in and immediately adjacent to the analysis area are shown in **Figure 3.14-2** (Sheets 1-4). Although timber outside of the analysis area would not be affected by SGP activities, it is shown to provide the reader with a larger, landscape-wide context.

[1] For more detailed explanation of mid-Level vegetation map units and the conifer dominance types found on the PNF and BNF please see the *Mid-Level Vegetation Map Unit Descriptions* for the PNF and BNF (Forest Service 2014a, 2014b).

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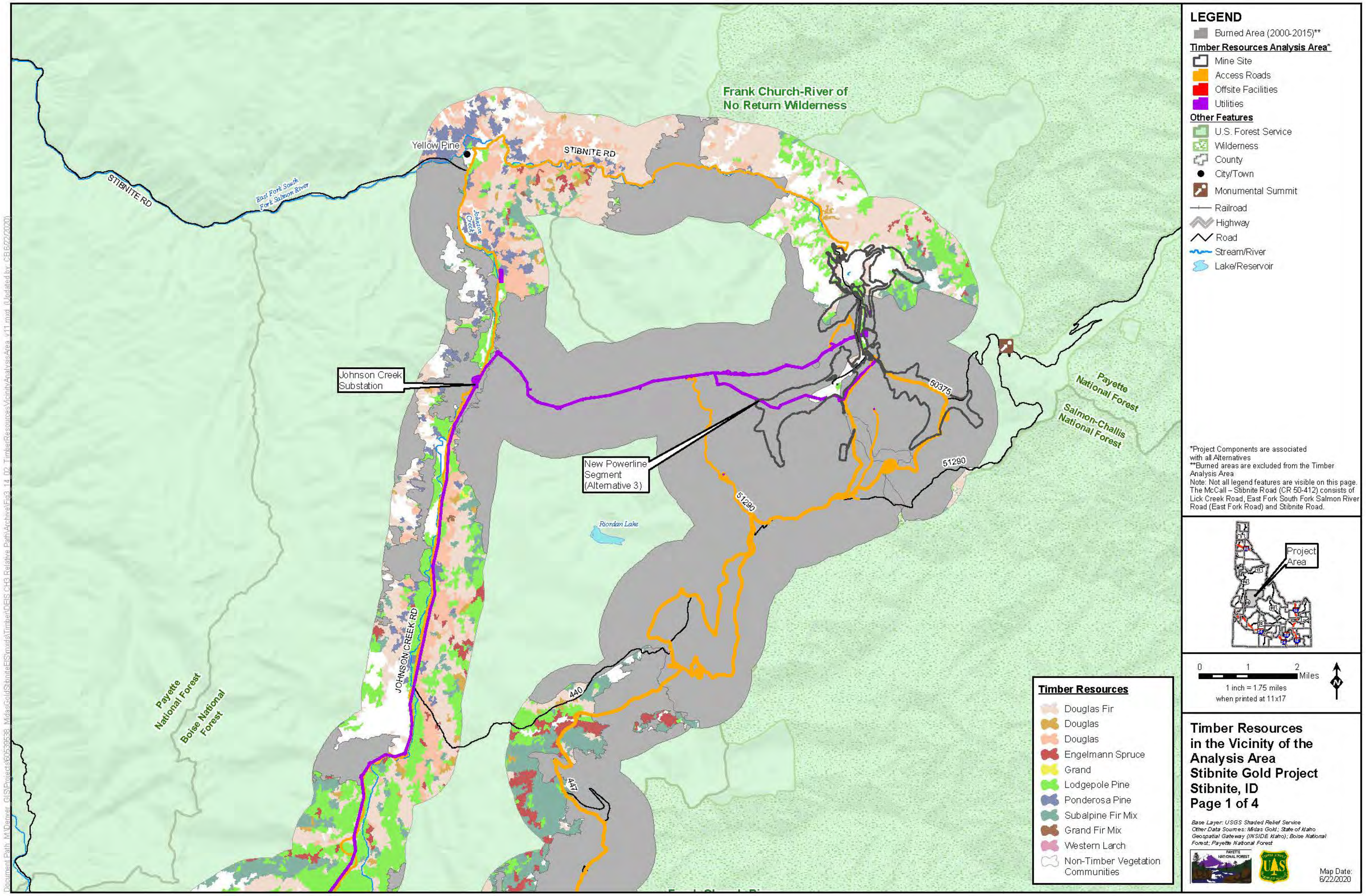

Figure Source: AECOM 2020

Figure 3.14-2 Timber Resources in the Vicinity of the Analysis Area - Sheet 1 of 4

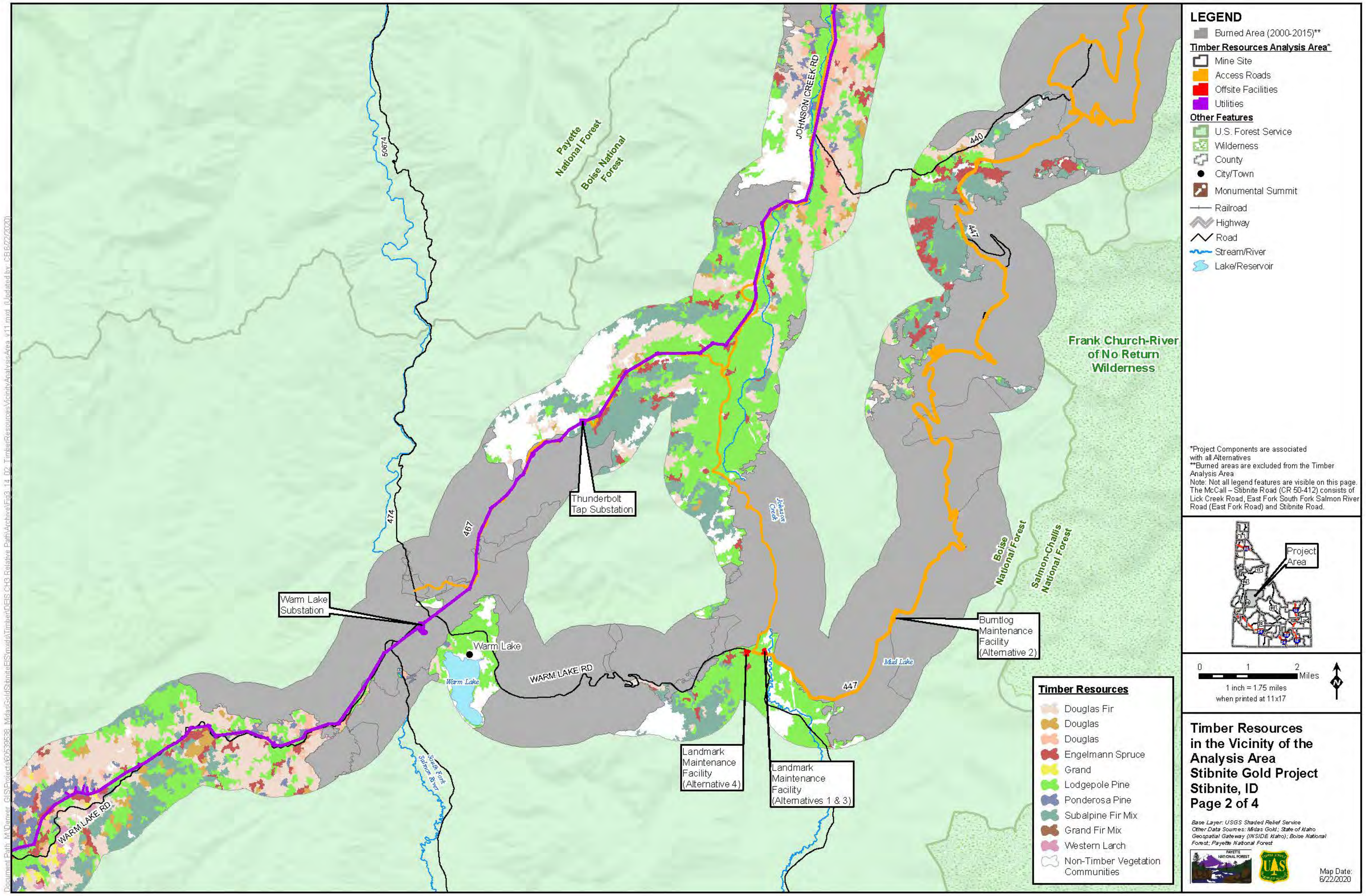

Figure Source: AECOM 2020

Figure 3.14-2 Timber Resources in the Vicinity of the Analysis Area - Sheet 2 of 4

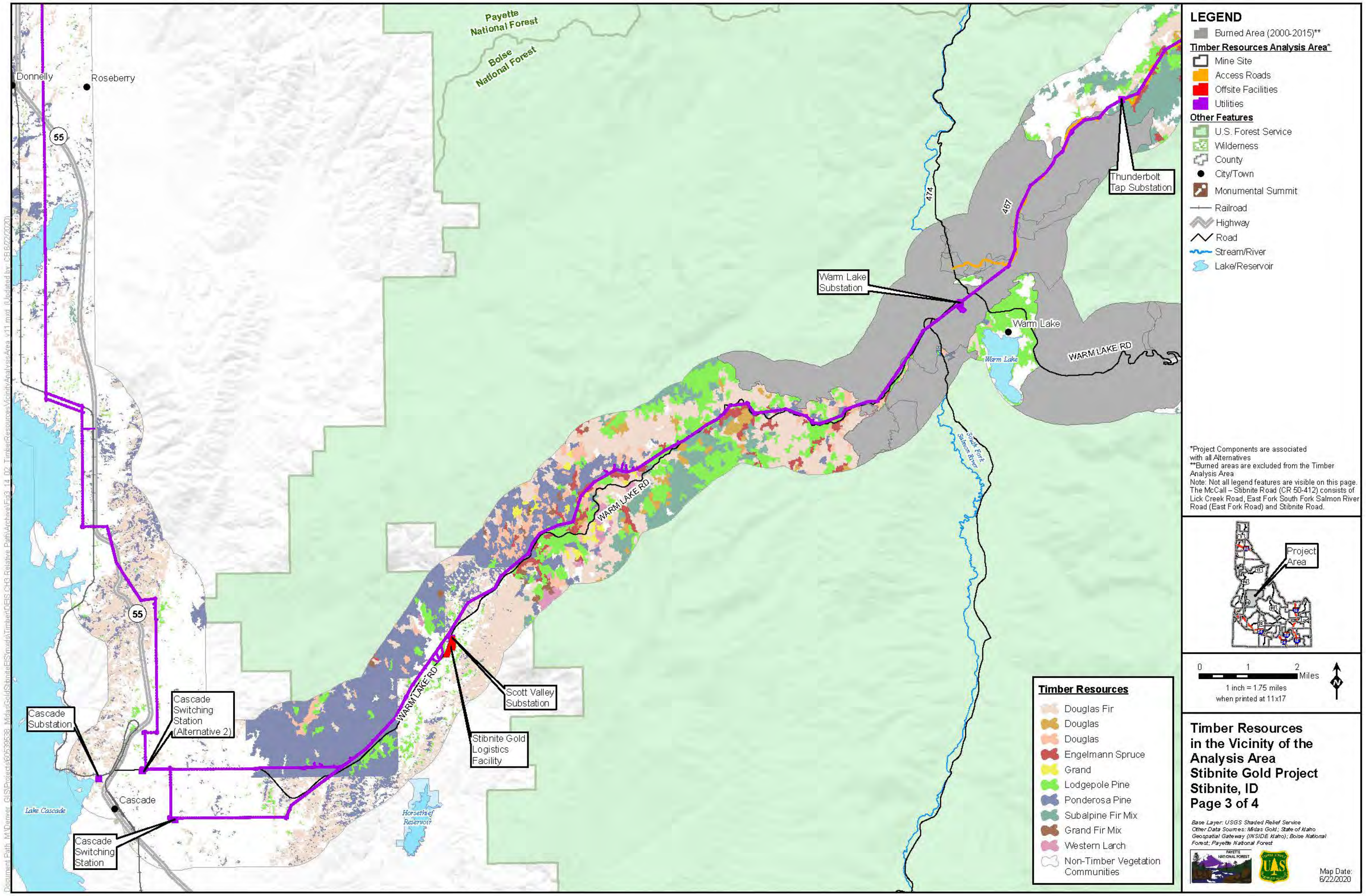

Figure Source: AECOM 2020

Figure 3.14-2 Timber Resources in the Vicinity of the Analysis Area - Sheet 3 of 4

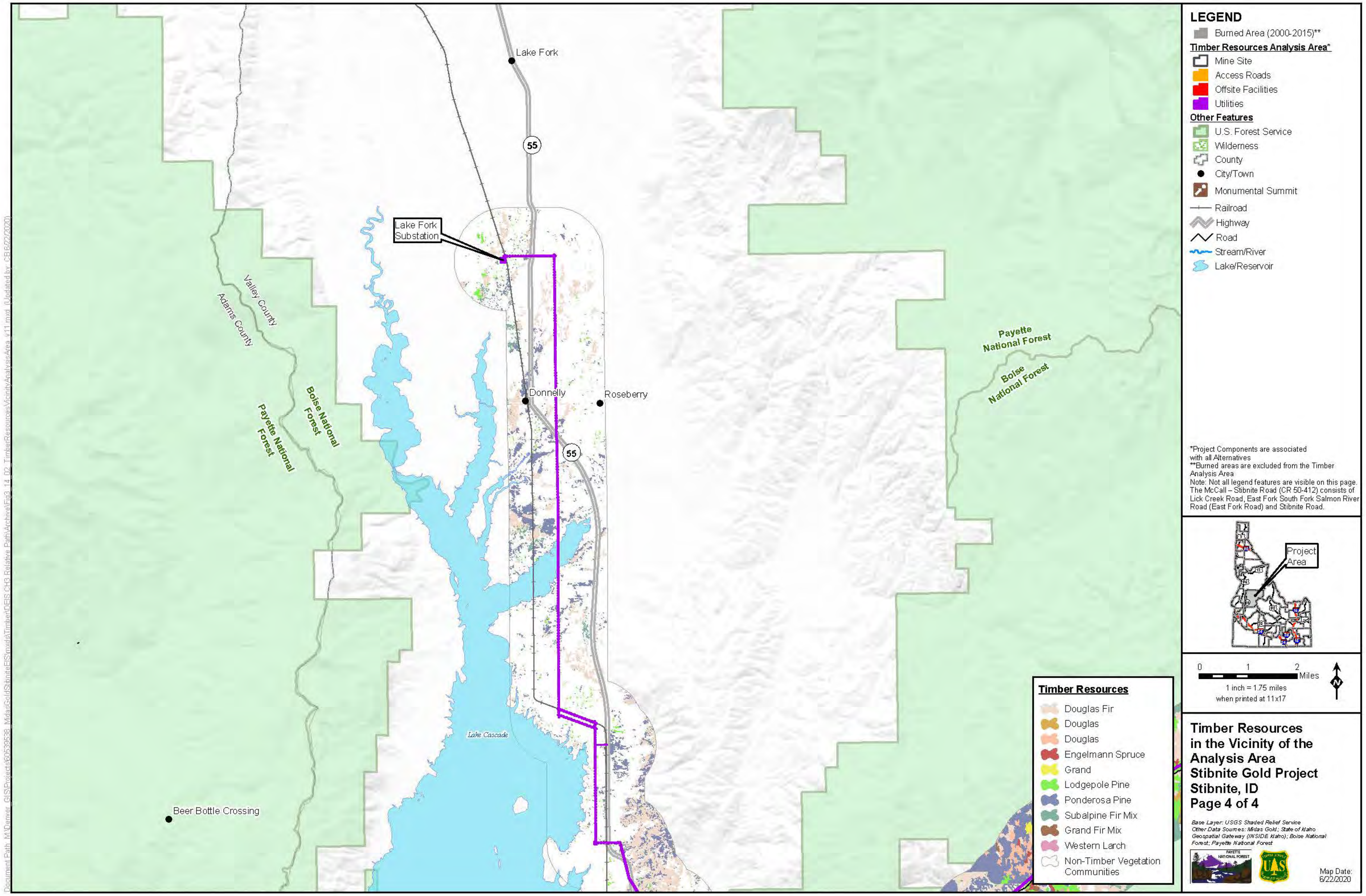

Figure Source: AECOM 2020

Figure 3.14-2 Timber Resources in the Vicinity of the Analysis Area - Sheet 4 of 4

3.14.3.2 Timber Resources

Many conifer tree species that are commonly harvested for commercial use are found in the analysis area. Coniferous Forest communities dominated by these species, either in monotypic (single species) stands or multi-species stands, are considered to contain timber resources. Timber resources (both sawtimber and other tree-based forest products) include materials used to develop timber products as well as "special forest products." Timber resources in the analysis area are derived from trees traditionally used for forest products and include the following merchantable species of conifers:

- Douglas-fir
- Engelmann spruce
- Lodgepole pine
- Ponderosa pine
- Grand fir
- Subalpine fir
- Western larch
- Subalpine larch

The above list excludes pinyon, limber pine, juniper, and whitebark pine[2] because they typically are not harvested for sale in the PNF or BNF (Witt et al. 2012), and vegetation communities dominated by these species are not included in the analysis area. However, in the event individuals of these species or other non-timber conifer species are encountered during SGP implementation they would be processed as timber species and included in merchantable volumes.

Special forest products, which are derived from sub-merchantable trees, sold from the PNF and BNF include Christmas trees, transplants (e.g., trees, shrubs, or herbaceous plants), fuelwood, and posts and poles (Forest Service 2017a). Special forest products also are called non-convertible products, because they are products that are not converted into board foot or cubic foot measure. The analysis area contains a mix of sawtimber and sub-merchantable trees, and while sawtimber is reported in volume of wood as well as acres within the analysis area, sub-merchantable trees or "special forest products" are reported in terms of the acres they occupy.

3.14.3.3 Timber Extent

To determine the extent of timber resources in the analysis area, existing spatial vegetation mapping data from various sources[3], were combined to create a single consistent coverage in Geographic Information System. Once the vegetation community coverage dataset was complete, the subset of the data containing conifer-dominant vegetation communities was extracted, because it represents the potential timber resources in the analysis area. Areas that

[2] Although whitebark pine is a conifer species that has historically been cut for sale, it was excluded from the list of timber resources in the analysis area because it is no longer harvested for sale.

[3] Data used to determine the extent of timber resources were collected from a variety of sources, including existing vegetation geographic information system data from the PNF and BNF (Forest Service 2016, 2017b), publicly available LANDFIRE vegetation classification data (U.S. Geological Survey 2016), land ownership data managed by the Bureau of Land Management (2017), management prescription boundaries from the PNF and BNF, and mine claim data provided by Midas Gold.

do not support timber resources—either because the timber was recently removed (i.e., burned in a fire within the last 20 years) or not realistically present (i.e. within existing roads and within the existing transmission line corridor)—were then removed from the potential timber resources layer. The result provides the basis of the estimates of timber extent in the analysis area.

3.14.3.4 Timber Ownership

Timber resource ownership varies across the analysis area and determines the standards used to manage timber resources. Timber resources in the analysis area are found on land managed by the Forest Service, privately owned land, state-owned land, and land managed by the BOR (Bureau of Land Management 2017; Forest Service 2016) (**Table 3.14-1**). NFS land in the analysis area includes unclaimed areas and unpatented claims[4], both of which contain timber resources. Timber on unclaimed areas and unpatented claims within NFS land is managed by the Forest Service subject to applicable claimant rights associated with unpatented claims. Timber on patented claims is considered “private,” like timber on other private lands in the analysis area. Timber that is managed by the Forest Service is subject to applicable Forest Service management directives, while private timber is not. Privately owned timber is subject to guidelines set by the State of Idaho as well as Valley County. Timber on BOR-managed land and state lands follow guidelines set by the State of Idaho for timber utilization.

Table 3.14-1 Land Ownership Across the Analysis Area

Underlying Land Ownership (manager)	Mining Claim Status[1]	Percent of the Analysis Area[2]
Public (Forest Service)	Unpatented	53
Public (Forest Service)	Unclaimed	33
Public (Forest Service)	**(Total)**	**87**
Public (BOR)	Unclaimed	<1
Public (BOR)	**(Total)**	**<1**
Private	Patented	6
Private	Unpatented	<1
Private	Unclaimed	5
Private	**(Total)**	**11**

[4] Lacking detailed information on unpatented claim dates, all unpatented mining claims in the analysis area are assumed to have been claimed post-1955, and therefore contain timber that is managed by the Forest Service.

Underlying Land Ownership (manager)	Mining Claim Status[1]	Percent of the Analysis Area[2]
State of Idaho	Unclaimed	2
State of Idaho	**(Total)**	**2**
(ALL land Management)	**Grand Total**	**100**

Table Sources: AECOM 2020; Forest Service 2003, 2010

Table Notes:

1 “Patented” refers to timber on patented claims, which is privately owned by the claimant; “unpatented” refers to unpatented claims. According to information provided by Midas Gold all of the SGP claims in the analysis area were staked after 1955 (Midas Gold 2017) and therefore all timber on these lands is managed by the surface land management agency (not by the claimant); “Unclaimed” refers to acreage lacking claim information in the available data, and it is assumed to contain timber that is managed by the surface land management agency.

2 “Percent of the Analysis Area” represents the portion of the analysis area covered by different land management entities and mining claim distinctions, calculated as a percent of the extent of the entire analysis area.

BOR = Bureau of Reclamation; Forest Service = U.S. Forest Service.

3.14.3.4.1 FOREST SERVICE TIMBER

On NFS lands, Forest Service commercial timber sale program harvest levels are set geographically and reported in volume (reported in thousand board feet [MBF]) of sawtimber allowed to be harvested for sale (Forest Service 2012). Forest Plan direction for the forest-wide ASQ, wood product extraction goals, and Total Sale Program Quantity also are reported in MBF (**Table 3.14-2**). The Payette and Boise Forest Plans do not provide direction for an allowable sale quantity of special forest products on NFS lands. However, because areas occupied by sub-merchantable timber resources are considered timberland vegetation, the removal of sub-merchantable timber constitutes a removal of timberland resource area from future production.

Table 3.14-2 Timber Harvest Goals from Payette and Boise Forest Plans

Timber Harvest Goal Metrics	Payette Forest Plan[1]	Boise Forest Plan[2]
Area of Suited Timberlands, Forest Wide	330,000 acres	527,500 acres
Allowable Sale Quantity (ASQ)	32,500 MBF	28,200 MBF
Wood Product Extraction Goal	7,800 MBF	11,500 MBF
Total Sale Program Quantity (TSPQ)	40,300 MBF	39,700 MBF

Table Sources: Forest Service 2003, 2010

Table Notes:

1 Record of Decision for the Final Environmental Impact Statement and Revised Land and Resource Management Plan (Revised Plan). McCall, ID. Table II-2, page II-30. (Forest Service 2003).

2 Boise National Forest Land and Resource Management Plan 2003-2010 Integration. Lowman, ID. Table II-2, page II-31. (Forest Service 2010).

ASQ = allowable sale quantity

MBF = thousand board feet

As described in Section 3.14.3.1, Timberland Vegetation, the Payette Forest Plan and Boise Forest Plan divide their lands into management areas (MAs), which are further subdivided geographically to account for different intended uses of different landscape areas. The subdivisions, or MPCs, specify the intended uses of a landscape unit, including whether timber harvest is an allowable use. If timber harvest is intended in a MPC, the unit will include "suited timberland" acreage (**Table 3.14-3**). Timber vegetation in the analysis area is found in one MA in the PNF: MA 13–Big Creek/Stibnite; and four MAs in the BNF: MA 17–North Fork Payette, MA 19–Warm Lake, MA 20–Upper Johnson Creek, and MA 21–Lower Johnson Creek. In the PNF, timber resources in the analysis area fall into two MPCs, neither of which include timber harvest as an intended use: MPC 3.1–Passive Restoration and Maintenance of Aquatic, Terrestrial, and Hydrologic Resources; and MPC 3.2–Active Restoration and Maintenance of Aquatic, Terrestrial, and Hydrologic Resources. In the BNF, timber resources in the analysis area fall within portions of MPCs 3.1 and 3.2, as well as MPC 4.2–Roaded Recreation Emphasis, and MPC 5.1–Restoration and Maintenance Emphasis in Forested Landscape. MPCs 5.1 and 4.2 in the BNF contain suited timberlands; therefore, timber removal and sale are allowed under special conditions and may contribute towards the ASQ for the BNF. MPCs 3.1 and 3.2 in the BNF do not contain suited timberlands. Timber resources in the portion of the analysis area containing suited timberlands (MPC 5.1 and MPC 4.2) are shown in **Figures 3.14-3a-c**.

Table 3.14-3 Timber Vegetation on Forest Service Management Areas by Management Prescription Code

Forest Plan MPC	Acres Designated as Suited for Timber Production[1]	Approximate Acres of Timber Vegetation per MPC[2]
PNF 13-Big Creek-Stibnite (3.1)	0	17,553.23
PNF 13-Big Creek-Stibnite (3.2)	0	11,125.54
Total PNF	**0**	**28,678.77**
BNF 17-North Fork Payette River (5.1)	34,300	5,263.92
BNF 19-Warm Lake (3.2)	0	25,729.38
BNF 19-Warm Lake (4.2)	4,800	2,140.24
BNF 20-Upper Johnson Creek (3.1)	0	31,424.22
BNF 20-Upper Johnson Creek (3.2)	0	15,648.11
BNF 21-Lower Johnson Creek (3.2)	0	11,093.05
BNF 21-Lower Johnson Creek (5.1)	16,000	14,533.29
Total BNF	**55,100**	**105,832.21**

Table Sources: Forest Service 2003, 2010, 2016, 2017b

Table Notes:

1 Acres designated as suited for timber production are based on reported acreages in the Payette Forest Plan and Boise Forest Plan.

2 Acres of timber vegetation in the Management Areas are based upon vegetation mapping provided by the PNF and the BNF.

PNF = Payette National Forest

BNF = Boise National Forest

3.14.3.4.2 State, Other Federal, and Private Timber

Unlike Forest Service timber resources, there is no NFMA land and resource management plan guiding the location and amount of timber resources intended to be harvested from the remainder of the analysis area. The State of Idaho Forest Practices Act, which would guide timber harvest from commercial timberlands on the other federal, state-owned, and private portions of the analysis area, sets requirements for timber harvest planning, harvest operation and reporting only (IDL 2018). The extent or presence of commercial timberlands in these other areas of the analysis area is not readily available information, and not considered significant or necessary for the analysis of the effects of the SGP.

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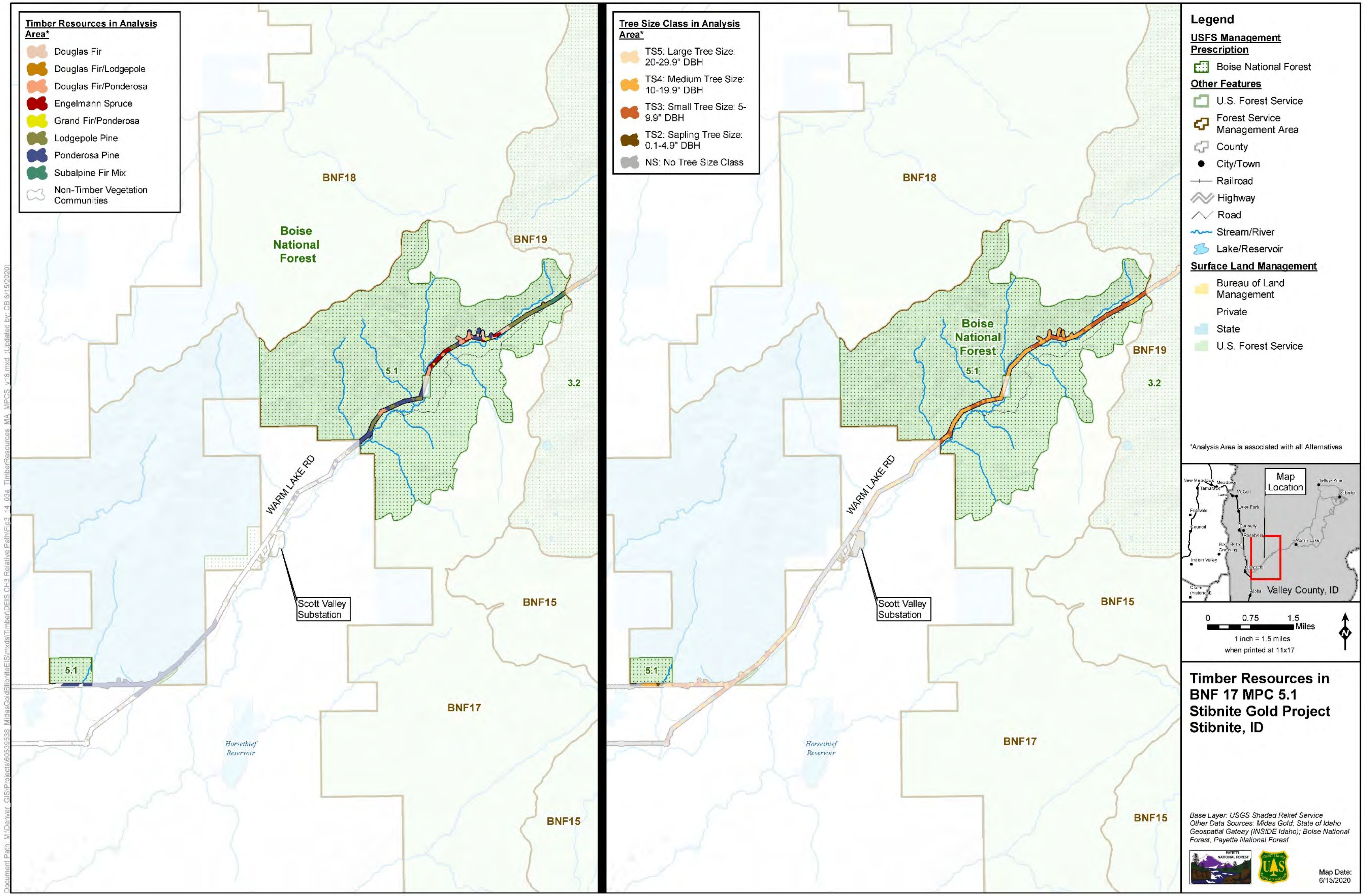

Figure Source: AECOM 2020

Figure 3.14-3a Timber Resources in BNF 17 MPC 5.1

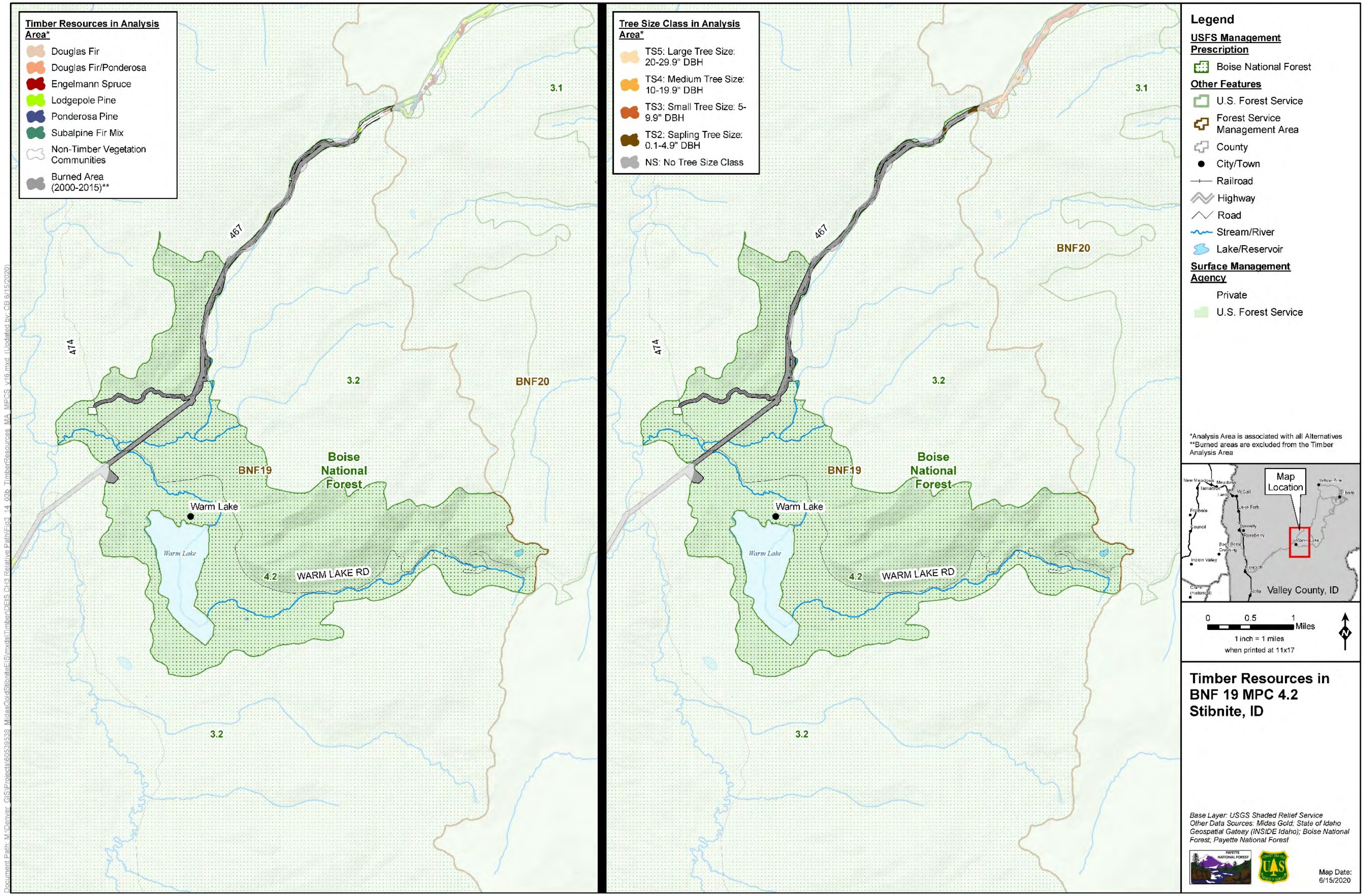

Figure Source: AECOM 2020

Figure 3.14-3b Timber Resources in BNF 19 MPC 4.2

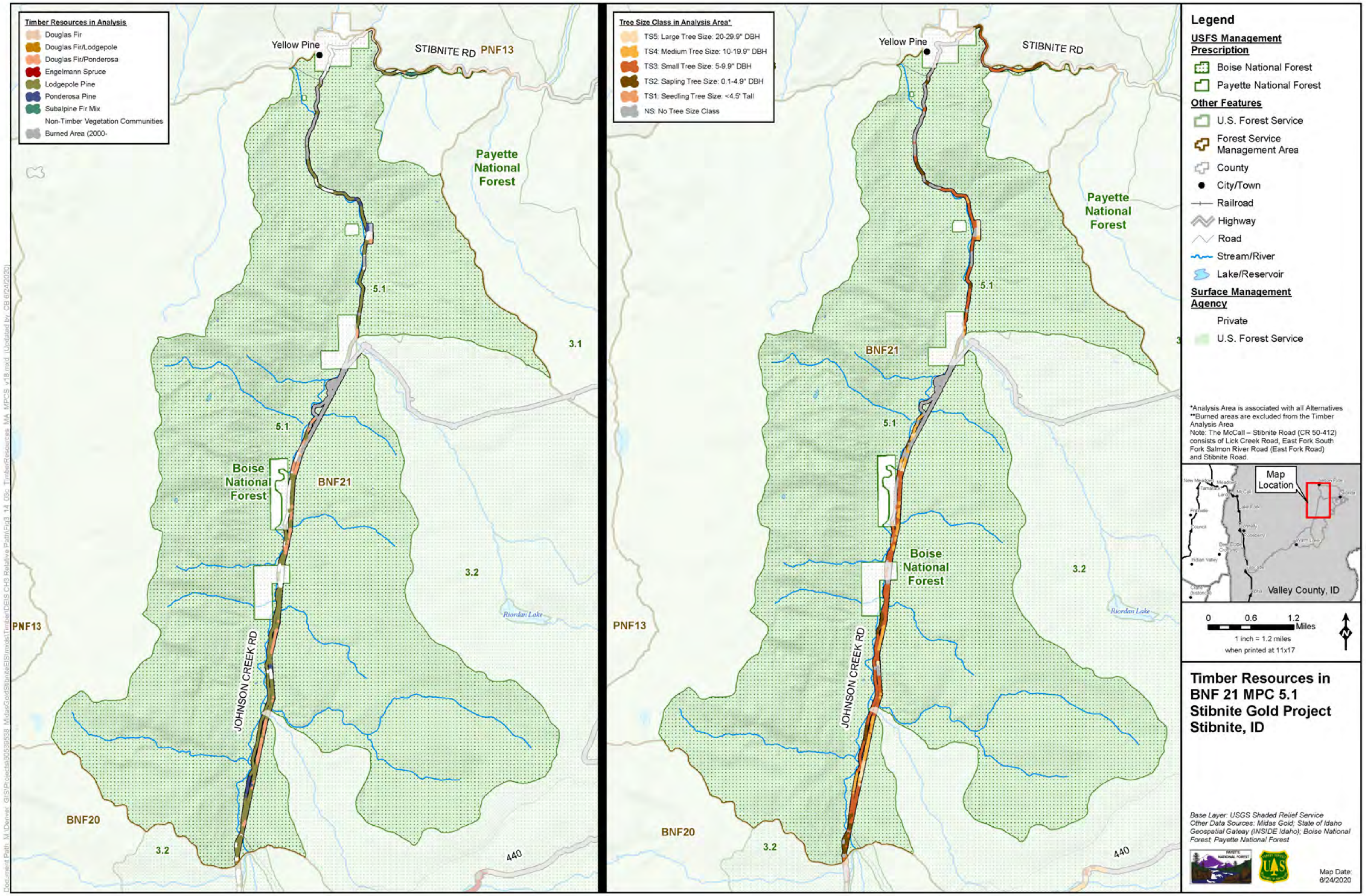

Figure Source: AECOM 2020

Figure 3.14-3c Timber Resources in BNF 21 MPC 5.1

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3.15 LAND USE AND LAND MANAGEMENT

3.15.1 Introduction and Scope of Analysis

This section describes the regulatory setting and existing land use patterns and land management status in the Stibnite Gold Project (SGP) area. The analysis area for land use and land management includes the combined footprint of all proposed action alternative components for the SGP. Alternative components include the proposed mine site, all associated mine support infrastructure, all access and haul roads (proposed and existing), all utility infrastructure (proposed and upgraded), and proposed off-site facilities. The SGP area covers approximately 4,427 acres (**Table 3.15-1**). The SGP area and land status are shown in **Figure 3.15-1**. The SGP area primarily consists of National Forest System (NFS) lands on the Payette National Forest (PNF) and the Boise National Forest (BNF). Private, state, and Bureau of Reclamation lands also are included in the SGP area. Land use in the analysis area consists of mining uses (mine site, access roads, utilities), agriculture, residential, fisheries, timber, tribal, recreational, and special uses. The discussion of existing conditions provides a land use context for the collective SGP area that could be impacted by any action alternative. The environmental consequences (Section 4.15) discussion focuses solely on impacts to land administration or ownership, use, and management in the individual disturbance footprint for each alternative.

Table 3.15-1 Land Ownership in the SGP Area[1] (Acres)

Land Ownership	Acres	% of SGP Area
Private	925	*21*
State	77	*2*
Boise National Forest	1,027	*23*
Payette National Forest[2]	2,373	*54*
Bureau of Reclamation	25	*<1*
Total[3]	**4,427**	***100***

Table Source: AECOM 2020

Table Notes:

1 The analysis area for land use and land management includes the combined footprint of all proposed action alternative components for the SGP area. Alternative components include the proposed mine site, all associated mine support infrastructure, all access and haul roads (proposed and existing), all utility infrastructure (proposed and upgraded), and proposed off-site facilities.

2 Approximately 20 acres of land listed under the PNF is administered by the PNF but is within the boundary of the Salmon-Challis National Forest.

3 Subtotals may not add to totals due to rounding.

3.15.2 Relevant Laws, Regulations, Policies, and Plans

The following is a brief discussion of applicable laws, regulations, policies, and plans related to land use and land management in the analysis area.

3.15.2.1 Federal

3.15.2.1.1 GENERAL MINING ACT OF 1872 (THE 1872 MINING LAW)

The General Mining Act of 1872, or the 1872 Mining Law, (30 United States Code [USC], Chapter 2) and subsequent amendments established the statutory right to locate, develop, and extract mineral deposits on public domain lands open to mineral entry. The U.S. Forest Service (Forest Service) regulates locatable mineral operations on the surface of the NFS lands under regulations codified at 36 Code of Federal Regulations (CFR) 228A.

3.15.2.1.2 ORGANIC ADMINISTRATION ACT OF 1897

The Organic Administration Act of 1897 (30 Statute 11, as amended; 16 USC 473-475, 477-482, 551) authorized the establishment of National Forest Reserves to improve and protect the condition of forested areas of the U.S., and to provide a continuous supply of timber for the use and necessities of the public.

3.15.2.1.3 MINING AND MINERALS POLICY ACT

Section 101 of the Mining and Mineral Policy Act (30 USC 21a) established a national mining and minerals policy. The policy confirms the national interest to foster and encourage private enterprise.

3.15.2.1.4 MULTIPLE USE ACT OF 1955

The Multiple Use Act of 1955 (69 Statute 367, 30 USC 612) states that mining claims patented prior to 1955 provide the owner with the rights under Forest Service Manual 2800. There are no unpatented mining claims within the SGP area that predate the 1955 Act.

3.15.2.1.5 NATIONAL FOREST ROADS AND TRAILS ACT OF 1964

The National Forest Roads and Trails Act (16 USC 532-538) authorized and established procedures related to rights-of-way (ROWs), easements, construction, and agreements for construction and maintenance of an adequate system of roads and trails in and near National Forests.

3.15.2.1.6 WILD AND SCENIC RIVERS ACT

The National Wild and Scenic Rivers System was created by Congress in 1968 (16 USC 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection.

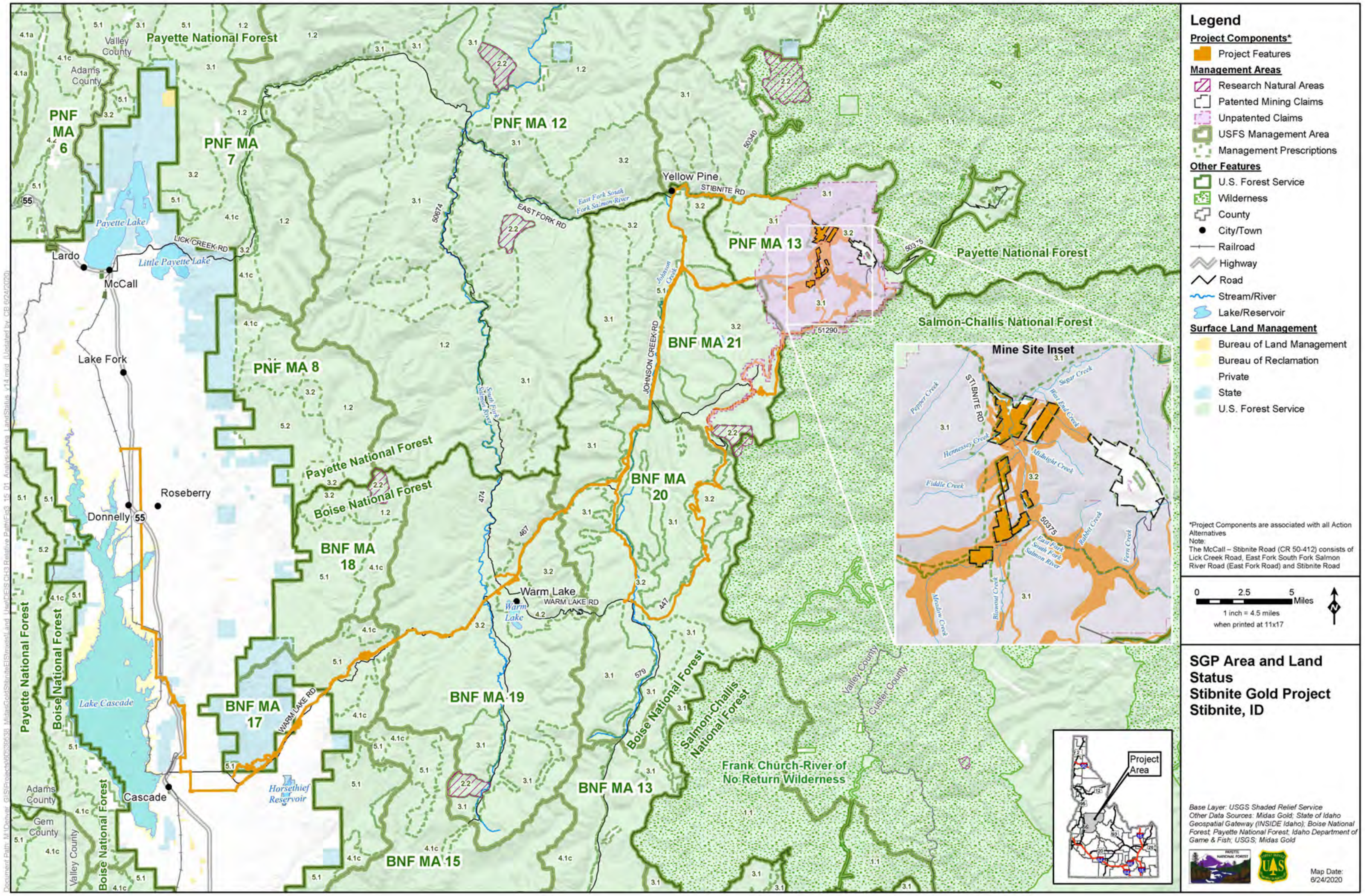

Figure Source: AECOM 2020

Figure 3.15-1 SGP Area and Land Status

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3.15.2.1.7 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

The Council on Environmental Quality guidelines that implement National Environmental Policy Act of 1969 (NEPA) (40 CFR 1500-1508) do not directly address potential effects to land use. However, NEPA does require federal agencies to analyze the expected environmental impacts of the agency's proposed action (40 CFR 1502.16).

3.15.2.1.8 NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for land use and land management and include various objectives, guidelines, and standards for this purpose.

3.15.2.1.9 IDAHO ROADLESS RULE

The Idaho Roadless Rule (36 CFR 294 Subpart C) established federal management direction for designated Roadless Areas in the State of Idaho to protect their important characteristics. This rule provides direction for designated Roadless Areas on NFS lands in Idaho.

3.15.2.2 State

3.15.2.2.1 IDAHO MINED LAND RECLAMATION ACT

The Idaho Mined Land Reclamation Act (Idaho Code Title 47, Chapter 15), which updated and amended the Idaho Surface Mining Act of 1972, was passed in March 2019. Under this act, surface and underground mining of minerals for ultimate or immediate sale, in either the natural or processed state, must have an approved reclamation plan. The act also requires financial assurance from the operator for the completion of site reclamation, public notice for mechanized exploration activity, incorporation of water treatment in reclamation plans, and reclamation of disturbed watercourses. Temporary rules implementing the act were put into place by the State Board of Land Commissioners in July 2019 and extended in March 2020.

3.15.2.2.2 STATE OF IDAHO LOCAL LAND USE PLANNING ACT (1972)

The State of Idaho Statutes Section 67-6502 states the purpose of the act is, in part, to "promote the health, safety, and general welfare of the people of the State of Idaho."

3.15.2.3 Local

3.15.2.3.1 Valley County Comprehensive Plan

The Valley County Comprehensive Plan applies to private land uses and to some public lands and uses within the county; some of the mining area and associated infrastructure would be located on private land in Valley County. The plan aims to ensure mining remains a viable element in Valley County's economy and to promote and encourage activities that will maintain a strong and diversified economy through maintaining the important role of the local timber industry, tourism, outdoor recreation, mining, and agriculture (Valley County 2018). Per Valley County Code Table 3-A, Section 9-3-1(6)(c)(1), mineral extraction regulated by state or federal agencies is identified as a permitted industrial use. Other uses subject to a conditional use permit that could pertain to the SGP include extractive industry uses; public utility supply, transfer, or relay facilities including administration; and warehousing of equipment and products. Valley County Code Section 9-5A-2 identifies standards for roads and driveways, specifying public roads to be designed and constructed in accordance with Title 10 of the Valley County Code and in accordance with "Construction Specifications and Standards for Roads and Streets in Valley County, Idaho" (Valley County 2018).

3.15.2.3.2 City of Cascade Comprehensive Plan

The City of Cascade Comprehensive Plan provides goals, objectives, and action items pertaining to land uses in the "area of city impact." Goals and objectives to support development of energy services could be applicable to improvements in the existing transmission line corridor and/or widening of the ROW (City of Cascade 2018).

3.15.2.3.3 City of Donnelly Comprehensive Plan

The City of Donnelly Comprehensive Plan describes the desired future land use classifications, including zoning, in the "area of city impact." Objectives and policies to support development of energy services could be applicable to improvements in the existing transmission line corridor and/or widening of the ROW (City of Donnelly 2011).

3.15.2.4 Land Use Policies and Management

Land management in the analysis area is governed by the regulatory framework outlined in Section 3.15.2.1 through Section 3.15.2.3 above and is described in further detail below.

3.15.2.4.1 Federal

Federal lands in the analysis area are open to locatable mineral exploration and development under the 1872 Mining Law. The PNF Krassel Ranger District has jurisdictional authority over surface disturbance associated with mining and exploration activities on NFS lands in the SGP area.

All uses of NFS lands, improvements, and resources, except those provided for in the regulations governing the sale and disposal of timber and other forest products (36 CFR 223), minerals (36 CFR 228), and range management, including the grazing of livestock (36 CFR 222), are designated “special uses” and must be approved by an authorized officer (Title 36 CFR 251.50[a]). A special use permit for transportation and utility uses is obtained through the Standard Form (SF)-299 “Application for Transportation and Utility Systems and Facilities on Federal Lands.” Such an application for utility uses is generally prepared by the utility owner or operator and is subject to NEPA review. However, transportation and utility uses associated with mineral development activities are authorized under 36 CFR 228A as part of an operator’s plan of operations and do not require a separate special use permit.

A use authorization is required in accordance with 43 CFR 429.3 for certain uses or activities on Bureau of Reclamation land. Uses or activities associated with the SGP may include infrastructure, such as transportation, telecommunications, and utilities; the possession or occupancy of, or extraction or removal of natural resources from, Bureau of Reclamation land, facilities, or waterbodies (including the removal of, or exploration for, sand, gravel, and other mineral resources); and the removal of commercial forest products or other vegetative resources.

The public ROW on federal lands is administered per Revised Statute 2477. Revised Statute 2477 public ROWs are under the jurisdiction of Valley County. Though Revised Statute 2477 easements in the SGP area have been asserted by Valley County, none have been adjudicated.

3.15.2.4.2 STATE

The Payette Lakes Supervisory Area of the Idaho Department of Lands (IDL) has jurisdictional authority over exploration- and mining-related activities in its administrative area (Idaho Administrative Procedure Act 20.03.02).

Easements are required for all permanent ROWs on state-owned lands. The existing transmission line is authorized to Idaho Power Company, and a portion of this ROW intersects State Endowment Lands. The IDL is responsible for granting or modifying the transmission line ROW on state-owned lands, if required.

3.15.2.4.3 VALLEY COUNTY

The Valley County Comprehensive Plan (2018) recognizes that “private lands classified as mines and the related mining machinery, tools, and equipment” are subject to state and federal regulations pertaining to mining claims. Thus, impacts to private land from mining uses would be addressed through the state and federal authorization processes. If work along the transmission line corridor would impact other private lands in Valley County (such as privately-owned parcels in the Warm Lake area), then a conditional use permit from Valley County may be required.

The existing transmission line corridor crosses lands designated by the Valley County Comprehensive Plan as “Rural” and “Cities and City Areas of Impact.” A “Rural” designation applies to all real property in the unincorporated areas of Valley County; this designation applies to all privately-owned land and public lands and uses subject to Valley County's planning jurisdiction.

Commercial and industrial uses are permitted in rural areas but are encouraged in cities and city areas of impact, villages, and tourist hubs (Valley County 2018). A “Cities and City Areas of Impact” land use designation applies to all real property in incorporated city limits or adopted areas of impact. Most commercial and industrial uses may occur in areas with this designation; however, development standards are governed by the cities or, in the areas of impact, by the adopted Area of Impact Agreement.

SGP components would overlap with Warm Lake, which is designated as a “Tourist Hub.” The “Tourist Hub” designation applies to properties shown on the County’s land use map for tourist services, and any expansion of these services should be encouraged in the tourist hubs. The mapped boundaries associated with this designation are advisory only and are expected to be flexible (Valley County 2018).

3.15.3 Existing Conditions

This section discusses land use and land management specific to the analysis area. Existing land use and land management, including existing access roads, utilities, and off-site facilities, is shown in **Figure 1.2-1**.

3.15.3.1 Land Ownership and Status

The SGP area is composed of lands administered by the Forest Service (the PNF Krassel Ranger District and BNF Cascade Ranger District), the State of Idaho, Bureau of Reclamation, and private lands. **Table 3.15-1** summarizes land ownership in the SGP area for all acres affected by all alternatives.

3.15.3.1.1 Patented and Unpatented Mining Claims

The analysis area includes both patented and unpatented mining claims in the PNF Krassel Ranger District and the BNF Cascade Ranger District. Affiliates of Midas Gold Idaho, Inc. (Midas Gold) own or control patented and unpatented mill site and lode claims in the SGP area. An unpatented mining claim is a parcel of land open to mineral entry where a right of possession on the parcel for the extraction and development of a mineral deposit has been asserted. The Bureau of Land Management administers unpatented mining claim rights, regardless of surface management agency. The Forest Service manages the surface resources on an unpatented mining claim. Affiliates of Midas Gold hold approximately 2,455 acres of unpatented claims (**Table 3.15-2**) on NFS land in the SGP area. No land ownership has been conveyed for unpatented claims (Forest Service 2013). A patented mining claim is a claim for which the federal government has passed its title to the claimant, giving them exclusive title to the locatable minerals, and in most cases, the surface and all other resources. The Forest Service has no authority over patented claims except for reservations that may be explicitly noted in the patent that may include ditches, roads, and other exclusions. Affiliates of Midas

Gold own approximately 576 acres of patented claims (**Table 3.15-2**) in the SGP area (Forest Service 2013).

The Forest Service oversees mineral activities (e.g., exploration and mining) on the surface of unpatented mining claims in the SGP area. The Payette Lakes Supervisory Area office of the IDL has administrative jurisdiction on mining activities on patented mining claims within the SGP area.

Table 3.15-2 Patented and Unpatented Mining Claims in the SGP Area[1]

Patented Claims (Acres)	**576**
% Patented Claims	*19%*
Unpatented Claims (Acres)	**2,455**
% Unpatented Claims	*81%*
Total Claims Area (Acres)[2]	**3,030**

Table Source: AECOM 2020

Table Notes:

1 The analysis area for land use and land management includes the combined footprint of all proposed action alternative components for the SGP area. Alternative components include the proposed mine site, all associated mine support infrastructure, all access and haul roads (proposed and existing), all utility infrastructure (proposed and upgraded), and proposed off-site facilities.

2 Subtotals may not add to totals due to rounding.

3.15.3.2 Land Use

3.15.3.2.1 Mine Site

The proposed mine site area contains approximately 888 acres of existing disturbance, located on private (475 acres) and PNF (414 acres) land. The mine site currently contains pits, tailings, and development rock storage facilities from previous mining activities. Mining has occurred in three general locations: Hangar Flats, Yellow Pine, and West End, with additional areas of mining-related disturbance occurring throughout the proposed mine site; however, prior to Midas Gold acquiring and consolidating the patented mining claims, mining operations in the immediate mine site area had ceased. Intermittent restoration activities have taken place in the past as funding became available to the Forest Service. There are U.S. Environmental Protection Agency, Forest Service, IDL, and Idaho Department of Environmental Quality-funded remediation activities near the proposed mine site area (see Section 3.7.3.3, Past Releases, Remediation, and Mitigation).

3.15.3.2.2 Access Roads

There are three existing primary access routes to the proposed mine site area from Cascade or McCall: Yellow Pine, Lick Creek, and South Fork Salmon River routes (see Section 3.16.3.2, Primary Routes). The Yellow Pine Route is the only existing access route located in the SGP analysis area and includes Johnson Creek Road (County Road [CR] 10-413) and the Stibnite

Road portion of McCall – Stibnite Road CR 50-412. The proposed Yellow Pine Route corridor is approximately 36 miles long, and the footprint occupies approximately 130 acres. Burnt Log Road (National Forest System Road [FR] 447) is an existing 20-mile road in the SGP area; however, it does not currently provide access to the mine site. The proposed Burntlog Route corridor includes the existing Burnt Log Road and undeveloped lands where the route would connect with Meadow Creek Lookout Road (FR 51290).

3.15.3.2.3 UTILITIES

The Idaho Power Company operates approximately 64 miles of existing transmission lines in the SGP area, including a 42-mile, 69-kilovolt electric transmission line, and a 21.5-mile, 12.5-kilovolt electric transmission line. Existing transmission lines occupy approximately 321 acres in the SGP area, located on private (102 acres), state (18 acres), NFS (190 acres), and Bureau of Reclamation (11 acres) land. Idaho Power Company operates existing electrical substations located at Oxbow Dam, Horseflat, Scott Valley, McCall, Lake Fork, Warm Lake, and Thunderbolt Tap.

Existing communication facilities include a microwave relay tower installed by Midas Gold in 2013, located on private land atop a 9,000-foot peak east of the mine site.

3.15.3.2.4 OFF-SITE FACILITIES

There are no existing off-site facilities associated with the SGP within the analysis area. Midas Gold currently maintains an administrative office in Donnelly, and a core logging and storage facility in Cascade.

3.15.3.2.5 RIGHTS-OF-WAY AND EASEMENTS

There are approximately 345 acres of existing road ROW and 321 acres of existing transmission line ROW, totaling approximately 666 acres of existing ROW in the SGP area (**Table 3.15-3**).

Table 3.15-3 Acres of Existing Transmission Line ROWs in the SGP Area[1]

Land Management/ Ownership	Existing Transmission Line ROW
Private	**102**
% Private	*32%*
State	**18**
% State	*6%*
NFS	**190**
% NFS	*59%*
Bureau of Reclamation	**11**
% Bureau of Reclamation	*3%*
Total Area (Acres)[2]	**321**

Table Source: AECOM 2020

Table Notes:

1 The analysis area for land use and land management includes the combined footprint of all proposed action alternative components for the SGP area. Alternative components include the proposed mine site, all associated mine support infrastructure, all access and haul roads (proposed and existing), all utility infrastructure (proposed and upgraded), and proposed off-site facilities.

2 Subtotals may not add to totals due to rounding.

Current roads in the SGP area include Cabin Creek Road (FR 467), Warm Lake Road (CR 10-579), Johnson Creek Road (CR 10-413), Stibnite Road (CR 50-412), and the existing transmission line access roads. The existing transmission line ROW crosses private lands, as well as lands administered by the BNF, the PNF, Bureau of Reclamation, and the IDL. The SGP would intersect with numerous easements for road access, including a Forest Road and Trail Act easement along the Yellow Pine Route to the mine site. There is an additional easement in the SGP area for approximately one mile of an abandoned railroad that is adjacent to State Highway 55 between Cascade and Donnelly.

3.15.3.2.6 OTHER LAND USES

3.15.3.2.6.1 Agriculture

In Valley County, agricultural land uses are challenging due to a limited growing season, soil conditions, high water table, and occasional summer frosting. Agricultural lands offer potential for subdivision and second-home development. Agricultural lands are valued not only for production, but as open space (Valley County 2018).

3.15.3.2.6.2 Residential

The closest community to the SGP mine site is Yellow Pine, approximately 14 miles (northwest) from the mine site. The existing transmission line passes through the Thunder Mountain Estates subdivision approximately 1 mile east of Cascade. Residential land use types include homesite land, recreation land, rural residential tracts, rural residential subdivisions, other rural land, urban residential lots, common areas, condominiums or townhouses, and various improvements to residential uses and lands (Valley County 2018).

3.15.3.2.6.3 Fisheries

Activities pertaining to fisheries recovery are considered a major land use in and near the SGP area and are applicable to waterbodies in the SGP area. Recovery plans focus on actions that contribute to land use and land management actions including maintaining, protecting, and restoring tributary habitat; improving passage through barrier removal; reducing sediment delivery to streams by improving roads, riparian communities, and rehabilitating mine sites; restoring connectivity of populations; and conducting research and monitoring to implement and evaluate recovery activities. Section 3.12, Fish Resources and Fish Habitat, includes additional information regarding fisheries in the SGP area.

3.15.3.2.6.4 Timber

Timber harvest on NFS lands is guided by Forest Service regulations. The Forest Service determines lands suitable for timber removal where commercial timber harvest could occur through the land and resource management planning process. On state and private lands, timber resources could be harvested in a manner that is compliant with IDL regulations (see Section 3.15.2.1.4, Multiple Use Act of 1955). Timber resources in the SGP area are found on NFS, private, state, and Bureau of Reclamation land. Section 3.14, Timber Resources, includes additional information regarding timber resources.

3.15.3.2.6.5 Tribal Uses

Regional tribes exercise off-reservation rights for traditional land uses such as fishing, hunting, and gathering on NFS lands. These land uses are protected through the U.S. Constitution, treaties, executive orders, statutes, and court decisions; they collectively protect and enhance the ability of the tribes to exercise rights and cultural practices off-reservation. Section 3.24, Tribal Rights and Interests, includes additional information regarding tribal rights and responsibilities.

3.15.3.2.6.6 Recreation and Special Uses

Public lands in the SGP area are widely used for recreation purposes. This includes NFS and state lands, which collectively make up about 80 percent of lands in the SGP area. Recreation use occurs during all seasons in the form of motorized recreation (e.g., all-terrain vehicles, snowmobiles), hunting and fishing, hiking, camping, biking, cross-country skiing, and snowshoeing. Nearby recreational facilities include trailheads, campgrounds, lookouts/cabins, picnic areas, and dispersed recreation areas. Outfitters and guides operate in the National Forests under Special Use Permits. Section 3.19, Recreation, includes additional information on current recreation uses in the SGP area.

3.16 ACCESS AND TRANSPORTATION

3.16.1 Introduction and Scope of Analysis

This section provides the affected environment for access and transportation. This section describes the existing conditions for access and transportation systems that currently serve the Stibnite Gold Project (SGP) area and also includes a summary of the relevant laws, regulations, policies, and plans.

The analysis area for access and transportation, which focuses on the existing and proposed roads (many unpaved) providing access and transport to and from the proposed mine site, off-site facilities, and transmission line, is shown in **Figure 3.16-1**. For transportation purposes, the analysis area corresponds with the area where activities for the SGP would occur with some discussion of routes that pass through the area, serve adjacent lands, or provide motorized access to or near the mine site. Although road transportation is the primary focus of the analysis area, a discussion of other modes of transportation (air, water, and rail) that are part of the transportation network also is included. The access and transportation analysis area includes portions of the Payette National Forest (PNF), Boise National Forest (BNF), and Valley County.

3.16.2 Relevant Laws, Regulations, Policies, and Plans

The SGP would occupy and use land associated with both private patented mining claims and unpatented mining claims located on public land administered by the U.S. Forest Service (Forest Service). For transportation resources, the Forest Service provides federal oversight on the Forest Transportation System, including the National Forest System (NFS) roads, NFS trails, and airfields on NFS lands. Forest Service regulation 36 Code of Federal Regulations (CFR) 228.12 – Access, specifically addresses providing access across NFS lands for locatable mineral operations. The Idaho Transportation Department (ITD) provides jurisdiction for State Highway (SH) 55, the main north-south road providing access to the analysis area. Valley County provides jurisdiction for local public roads, such as Warm Lake Road. The Payette National Forest Land and Resource Management Plan (2003) and Boise National Forest Land and Resource Management Plan (2010), PNF Forest-wide Travel Analysis Report (2015a), and the BNF Forest-wide Travel Analysis Process Report (2015b), along with the Valley County Master Transportation Plan provide standards and guidance on how the transportation network should be managed.

3.16.2.1 National Forest Management Act

The National Forest Management Act of 1976 directs that roads be designed to standards appropriate for intended uses and requires the revegetation of roads within 10 years of the termination of temporary and undeveloped roads created under contract, permit, or lease unless it is later determined that the road is needed for use as part of the National Transportation System (16 United States Code 1608 [b] and [c]).

3.16.2.2 Forest Roads and Trail Act Easements

Section 2 of the Forest Roads and Trails Act (FRTA) authorizes the road and trail systems for National Forests, the granting of easements across NFS lands, the construction of maximum economy roads, and the imposing of requirements on road users for maintaining and reconstructing roads (16 United States Code 532 et seq.). In addition, Forest Service Manual (FSM) 7703.3 states that, “Wherever possible, transfer jurisdiction over any NFS road and associated Forest transportation facilities (FSM 7705) to the appropriate public road authority when the road meets any of the following criteria: a) More than half the traffic on the road is not related to administration and use of NFS lands; b) The road is necessary for mail, school, or other essential local governmental purposes; c) The road serves yearlong residents within or adjacent to NFS lands” (Forest Service 2016).

3.16.2.3 Travel Management Rule

Travel management planning is regulated by 36 CFR 212, 251, 261, and 295 – Travel Management; Designated Routes and Areas for Motor Vehicle Use; Final Rule. The final rule, effective in 2005, requires designation of roads, trails, and areas that are open to motor vehicle use by class of vehicle and applies to both summer and winter travel. The Travel Management Rule is divided into three subparts: A, B, and C, which are described in the following paragraphs (Forest Service 2019a).

Subpart A is the administration of the Forest Transportation System and includes the definitions for Part 212, which governs administration of the forest transportation system, designation of roads, trails, and areas for motor vehicle use (including off-highway vehicles [OHVs]). In compliance with 36 CFR 212.5(b), the PNF and BNF both completed a travel analysis process in September 2015 to inform future National Environmental Policy Act travel management decisions including identification of the minimum road system, identification of unneeded roads to be decommissioned or converted to other uses, and other changes to NFS roads, which include revisions to motor vehicle use designation (Forest Service 2019a,b,c).

Subpart B is the designation of roads, trails, and areas for motor vehicle use. The motor vehicle use map is developed under 36 CFR 212.51 (Forest Service 2019a). OHVs are any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, or other natural terrain.

Subpart C designates and regulates use specifically for over-snow vehicles (OSVs). OSVs are defined as motor vehicles designed for use over snow that run on tracks and/or a ski or skis while in use over snow (36 CFR 212.1). The Forest Service issued orders including maps showing the areas where OSV use is allowed, prohibited, or restricted.

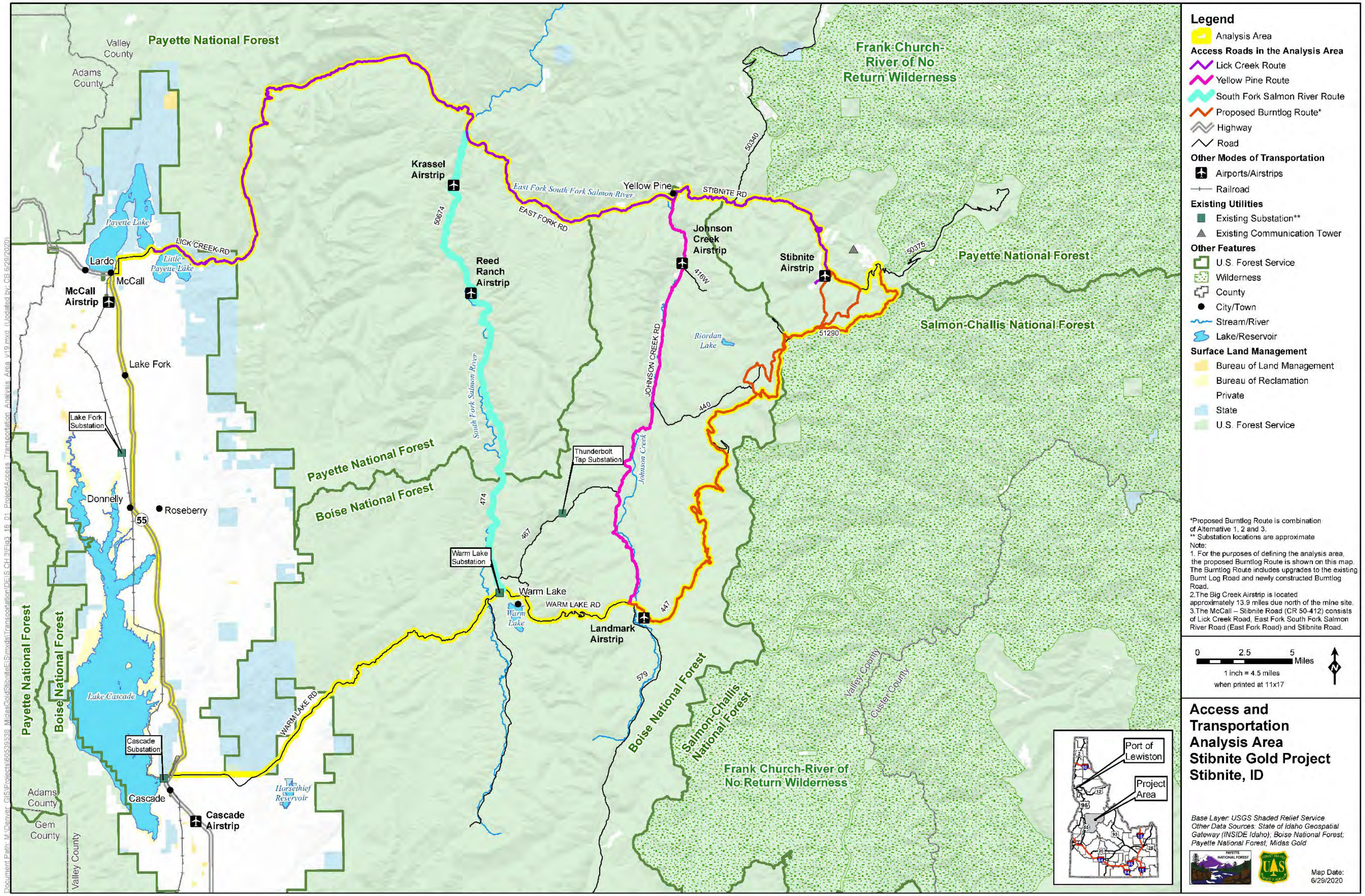

Figure Source: AECOM 2020

Figure 3.16-1 Access and Transportation Analysis Area

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3.16.2.4 Forest Service Manuals

The FSMs contain descriptions of legal authorities, objectives, policies, responsibilities, instructions, and guidance to Forest Service staff to plan and execute assigned programs and activities. FSM 2700 provides direction for special uses management on NFS lands. Chapter 2730 covers policies, authorities, and direction for granting rights-of-way for roads and trails across NFS lands and interests in lands. FSM 5400 covers landownership and Chapter 5460 provides direction concerning right-of-way acquisition. FSM 7700 provides direction for the planning, construction, reconstruction, operation and maintenance of the forest transportation system. It sets forth the authority, objectives, policy, responsibility, and definitions related to the forest transportation system.

3.16.2.5 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for access and transportation and include various objectives, guidelines, and standards for this purpose.

3.16.2.6 State of Idaho Rules

The Idaho Surface Mining Act (Title 47, Chapter 15) requires the state to regulate mining activities, including but not limited to, mineral exploration, mining operations, reclamation of lands affected by exploration and mining operations. Implementing regulations under Idaho Administrative Procedure Act 20.03.02 include provisions regarding the design, construction, maintenance, and reclamation of mining roads.

3.16.2.7 Valley County Master Transportation Plan

Valley County adopted its 2008 Master Transportation Plan to address the impacts of growth on the existing transportation system in the western portion of the county along SH 55 (Valley County 2008a). The Master Transportation Plan accounts for future growth and changes in land uses under Valley County's jurisdiction. Valley County proposed recommendations for future improvements to the Valley County transportation network to support this anticipated growth.

3.16.3 Existing Conditions

This section presents a brief description of local and regional transportation systems existing on land, air, and water in the analysis area, including roads, rail, port, and airstrips. The section focuses mainly on the local and regional road transportation system and provides a discussion of the road system development history, existing roads and areas of motorized access in the analysis area, vehicle accident data, and current (2015-2017) traffic volumes. The analysis area is dominated by unpaved roads, one state highway, and county roads (CRs).

Baseline information, including annual average daily traffic (AADT) data for PNF and BNF, as well as accident data, are derived from Forest Service, ITD, Midas Gold Idaho, Inc. (Midas Gold), and Valley County data to provide a characterization of the analysis area. A general overview of existing plans, road maintenance, and road standards also are included in the discussion below.

3.16.3.1 Existing Road Transportation Network

The Stibnite Mining District has been explored and mined since the early 1900s and included activities such as road construction and exploration. Many of the forest roads in the area were originally built to access mining claims or other remote sites and tend to be very steep, rocky, and winding (Forest Service 2019d).

The transportation network in the analysis area includes SH 55, Valley County roads, and NFS roads. Valley County maintains Warm Lake (CR 10-579), Johnson Creek (CR 10-413), and McCall-Stibnite (CR 50-412)[1] roads on NFS lands through easements issued under the FRTA. There are approximately 130 miles of state roads, approximately 278 miles of Valley County roads, and approximately 1,557 miles of NFS roads in the analysis area.

Table 3.16-1 lists the existing primary roads in the analysis area by name, NFS road or CR number, a brief description of the route, including: jurisdiction, length, surface treatment, and Forest Service maintenance level (as appropriate). The road width of SH 55 generally spans from 20 to 24 feet and the average posted speed limit is 55 miles per hour. Valley County road travelway widths range from 14 to 26 feet and general speed limits range from 20 to 50 miles per hour (Valley County 2008b). NFS roads in the SGP area range from 10 to 16 feet wide for travelways. Most NFS roads do not have posted speed limits, but generally have a design speed limit of 5 to 15 miles per hour depending on the level of service and design criteria of the road. Most roads in the PNF and BNF are single-lane, native surfaced roads with high rock fragment content from the rocky terrain and include pullouts for passing vehicles. General maintenance during snow-free months consists of grading and re-compacting the road base, intermittent dust control, and periodic cleaning of drainage culverts and ditches. Refer to **Appendix N**, Recreation, for a comprehensive list of roads and trails in the recreation analysis area.

[1] For the purposes of this Environmental Impact Statement analysis, McCall-Stibnite Road (CR 50-412) will be presented as three segments to provide a more location-specific discussion of existing conditions and potential impacts associated with the SGP. These three segments include: Lick Creek Road (from SH 55 east to South Fork Salmon River Road [National Forest System Road {FR} 50674]), East Fork Road (from South Fork Salmon River Road [FR 50674] east to the village of Yellow Pine), and Stibnite Road (from the village of Yellow Pine east to the mine site).

The Forest Service Road Maintenance Levels are defined by the Forest Service Handbook 7709.59 as the level of service provided by, and maintenance required for, a specific road which are consistent with road management objectives and maintenance criteria (Forest Service 2012). Maintenance levels are summarized below per Forest Service Handbook 7709.59 Section 62.32:

- **Maintenance Level 5** – “Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities.” Some may have an aggregate surface and dust abatement may be used. They are usually an arterial or collector road. Typically, connect to state roads and CRs and include some developed recreation roads.
- **Maintenance Level 4** – “Assigned to roads that provide a moderate degree of user comfort and convenience at moderate traffic speeds. Most roads are double lane and have an aggregate surface.” However, some roads may be single lane. Some roads may be paved and/or dust abated. May connect to state and CRs and include some developed recreation roads.
- **Maintenance Level 3** – “Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.” Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Typically connect to arterial and collector roads or other maintenance level 3 roads. May include some dispersed recreation roads.
- **Maintenance Level 2** – “Assigned to roads open for use by high clearance vehicles. Passenger car traffic, user comfort, and user convenience are not considerations. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or specialized uses. Log haul may occur at this level.” Typically, these are local roads that connect to collectors and other local roads and may not be passable during periods of inclement weather.
- **Maintenance Level 1** – Assigned to intermittent service roads during the time they are closed to vehicular traffic, typically more than 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Roads receiving maintenance level 1 may be of any type, class, or construction standard, and may be managed at any other maintenance level while they are open for traffic. While being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Table 3.16-1 Existing Primary Roads in the Analysis Area

Name	FR/CR Number	Jurisdiction	Length	Access[1,2,3]	Notes
SH 55	--	ITD	120 miles From I-84 north to US 95	Open year-round to highway legal vehicles	Asphalt road; Plowed in winter
Warm Lake Road	CR 10-579	Valley County	34 miles From SH 55 east to Johnson Creek Road (CR 10-413)	Open year-round to all vehicles	Asphalt road; Plowed to Warm Lake Parking Area; Groomed OSV from Warm Lake Parking Area to Landmark (8 miles)
Johnson Creek Road	CR 10-413	Valley County	25 miles From Warm Lake Road (CR 10- 579) north to the Stibnite Road portion of the McCall-Stibnite Road (CR 50-412) at the village of Yellow Pine	Open year-round to all vehicles (wheeled vehicles seasonally restricted due to grooming)	Native surfaced road; Groomed OSV from Warm Lake Road (CR 10-579) north to Wapiti Meadow Ranch by Valley County; Plowed from Wapiti Meadow Ranch north to Yellow Pine by Valley County
Lick Creek Road	CR 50-412	Valley County	37 miles Portion of McCall-Stibnite Road (CR 50-412) from SH 55 east (in McCall) to South Fork Salmon River Road (FR 50674)	Open year-round to all vehicles (seasonally restricted due to snow)	Asphalt/native surfaced road; Plowed for the paved portion and from Zena Creek Ranch to the end and ungroomed in between
East Fork Road	CR 50-412	Valley County	16 miles Portion of McCall-Stibnite Road (CR 50-412) from South Fork Salmon River Road (FR 50674) east to the village of Yellow Pine	Open year-round to all vehicles	Native surfaced road; Plowed in winter by Valley County
Stibnite Road	CR 50-412	Valley County	14 miles Portion of McCall-Stibnite Road (CR 50-412) from the village of Yellow Pine east to Thunder Mountain Road (within the mine site)	Open year-round to all vehicles (seasonally restricted due to snow)	Native surfaced road; Plowed in winter by Midas Gold through agreement with Valley County
Warren-Profile Gap Road	CR 50-340	Valley County	27 miles From Stibnite Road (CR 50-412) north to Edwardsburg- Big Creek	Open year-round to all vehicles (seasonally restricted due to snow)	Native surfaced road
South Fork Salmon River Road	FR 50674	PNF	23 miles From FR 474 north to East Fork Road (CR 50-412)	Open year-round to highway legal vehicles (a 2-mile stretch between Buckhorn Creek Trailhead and Jackie Creek/Phoebe Creek Trailhead is open to all vehicles.)	Also locally known as South Fork Road; Asphalt road; Plowed in winter by Valley County (under Schedule A agreement) NFS ML: 4

Name	FR/CR Number	Jurisdiction	Length	Access[1,2,3]	Notes
South Fork Salmon River Road	FR 474	BNF	7 miles From Warm Lake Road (CR 10-579) north to FR 50674	Open year-round to highway legal vehicles	Also locally known as South Fork Road; Asphalt road; Plowed in winter by Valley County (under Schedule A agreement). NFS ML: 4
Burnt Log Road	FR 447	BNF	20 miles From Landmark east to end	Open year-round to all vehicles (seasonally restricted due to snow)	Native surfaced road; Last 0.25 to 0.5 mile of road is closed, and motorized traffic is prohibited; Groomed OSV route from Landmark by Valley County (approximately 9.8 miles total: 6 miles groomed and 3.8 miles of infrequently groomed). NFS ML: 3 (4 miles) and 2 (17 miles)
Thunder Mountain Road	FR 50375	PNF	18 miles From the east terminus of Stibnite Road (CR 50-412), then east to Lookout Mountain Trailhead	Open year-round to all vehicles	Native surfaced road. NFS ML: 2
Thunder Mountain Road	FR 440	BNF	8 miles From Johnson Creek Road (CR 10-413) east to Thunder Mountain Road/Riordan Trailhead	Open year-round to all vehicles	Also locally known as Old Thunder Mountain Road; Native surfaced road. NFS ML: 2
Meadow Creek Lookout Road	FR 51290	PNF	12 miles From Meadow Creek/Summit Trailhead north to Thunder Mountain Road (FR 50375)	Open year-round to all vehicles	Native surfaced road. NFS ML: 2
Horse Heaven Road	FR 416W	BNF	2 miles From Johnson Creek Road (CR 10-413) east to Hennessey Meadows/Riordan Trailhead	Open year-round to all vehicles	Also locally known as Riordan or Powerline Road; Native surfaced road. NFS ML: 2
Cabin Creek Road	FR 467	BNF	7 miles From South Fork Salmon River Road (FR 474) east to Spur FR 467P and Trout Creek Campground at Johnson Creek Road (CR 10-413)	Open to all vehicles from June 1 to September 15	Native surfaced road. NFS ML: 2

Name	FR/CR Number	Jurisdiction	Length	Access[1,2,3]	Notes
Paradise Valley Road	FR 488	BNF	1 mile From Warm Lake Road (CR 10-579) north to Cabin Creek Road (FR 467)	Open year-round to all vehicles	Dirt road. NFS ML: 2

Table Source: Forest Service 2005, 2018, 2019a-d; Valley County 2014, 2019

Table Notes:

1 Roads Open to Highway Legal Vehicles = These roads are open only to motor vehicles licensed under state law for general operation on all public roads within the state.

2 Roads Open to All Vehicles = These roads are open to all motor vehicles, including smaller off-highway vehicles that may not be licensed for highway use (but not to oversize or overweight vehicles under state traffic law).

3 Unless otherwise noted, FR roads are closed by snow in the winter and re-open once snow melts off in the spring. Therefore, roads do not open for through-traffic until at least mid-June and close to public use as early as October 15.

BNF = Boise National Forest; CR = County Road; FR = National Forest System Road; FRTA = Forest Roads and Trails Act; I = Interstate; ITD = Idaho Transportation Department; NFS = National Forest System; NFS ML: National Forest System Operational Maintenance Level; OSV = Over-snow Vehicle; PNF = Payette National Forest; SH = State Highway; US = United States.

The maintenance of certain NFS roads is coordinated between the Forest Service and Valley County through Schedule A agreements. Typically, NFS road maintenance activities (including dust control, removal of debris from roadway and rights-of-way, road repair, and snow removal) are coordinated with the Valley County Roads and Bridge Department. Most Valley County backcountry roads are closed through the winter and melt off in the spring (Valley County 2017). Similarly, NFS roads are closed by snow in the winter and re-open once the snow melts off in the spring. Therefore, roads do not open for through-traffic until at least mid-June and often close to public use as early as October 15.

3.16.3.2 Primary Routes

In the transportation analysis area, there are three existing primary routes to access the mine site from Cascade or McCall: Yellow Pine, Lick Creek, and South Fork Salmon River routes as shown on **Figure 3.16-1**.

3.16.3.2.1 YELLOW PINE ROUTE

During non-winter conditions (roads clear of snow), the mine site can be accessed from the City of Cascade by traveling northeast on Warm Lake Road (CR 10-579) for about 34 miles to Landmark, then north on Johnson Creek Road (CR 10-413) for approximately 25 miles to the village of Yellow Pine, and approximately 14 miles east on the Stibnite Road portion of McCall-Stibnite Road (CR 50-412) (Stibnite Road). The Yellow Pine Route, which only includes Johnson Creek Road (CR 10-413) and the Stibnite Road portion of CR 50-412, is currently used to access the mine site during the summer. During the winter, Valley County plows approximately 10 miles of Johnson Creek Road from Yellow Pine to Wapiti Meadow Ranch and Midas Gold (under agreement with Valley County) plows along Stibnite Road. Valley County grooms the remaining 17 miles of Johnson Creek Road from Wapiti Meadow Ranch to Warm Lake Road (CR 10-579) at Landmark for OSV use. Valley County does not plow Warm Lake Road from Warm Lake to Landmark. This section is a designated groomed OSV route.

3.16.3.2.2 LICK CREEK ROUTE

The mine site also can be accessed from McCall during non-winter conditions by traveling east on the Lick Creek portion of McCall-Stibnite Road (CR 50-412) (Lick Creek Road) for approximately 37 miles to the East Fork South Fork portion of McCall-Stibnite Road (CR 50-412) (East Fork Road), then approximately 16 miles to the village of Yellow Pine, and approximately 14 miles east on Stibnite Road. Lick Creek Road, is closed during the winter because of a high avalanche potential; however, East Fork Road and Stibnite Road are plowed from South Fork Salmon River Road (FR 50674) to Yellow Pine by Valley County and from Yellow Pine to the mine site by Midas Gold to access their private land inholdings in the area.

3.16.3.2.3 SOUTH FORK SALMON RIVER ROUTE

Additionally, the mine site can be accessed year-round from Cascade by traveling approximately 24 miles northeast on Warm Lake Road (CR 10-579) to the intersection with South Fork Salmon River Road (FR 474), then north on South Fork Salmon River Road

(FR 474 to FR 50674) for approximately 30 miles to McCall-Stibnite Road (CR 50-412), and approximately 30 miles east on McCall-Stibnite Road (i.e., East Fork Road and Stibnite Road). Some segments along South Fork Salmon River Road have sharp curves which can be challenging for heavy vehicle travel. However, this route currently provides the only access to the mine site during winter months.

3.16.3.3 Existing Seasonal Access for OHVs and OSVs

OHVs can access the roads and trails throughout the analysis area during both summer and winter seasons. Currently, OHVs can access the mine site area primarily from Stibnite Road to Thunder Mountain Road (FR 50375) in order to reach Monumental Summit and the Lookout Mountain Trailhead in the summer. For a more detailed discussion on existing recreational access within the recreation analysis area, refer to Section 3.19.3.3, Recreation Access.

During the winter, numerous roads in the analysis area are plowed for vehicle use or converted to trails groomed for OSV use. Specifically, Valley County plows the following roads/road sections for highway legal vehicle use during the winter: East Fork Road from South Fork Salmon River Road (FR 50674) to Yellow Pine; Johnson Creek Road (CR 10-413) from Yellow Pine to Wapiti Meadow Ranch, the beginning and end portions of Lick Creek Road (CR 50-412), South Fork Salmon River Road (FR 474/FR 50674), and Warm Lake Road (CR 10-579) from SH 55 to Warm Lake under existing FRTA easements. Midas Gold plows Stibnite Road (CR 50-412) from Yellow Pine to the mine site under an annual road maintenance agreement with Valley County to maintain access to their private land inholdings in the area.

Valley County currently grooms for OSV use the portion of Johnson Creek Road (CR 10-413) from Wapiti Meadow Ranch to Warm Lake Road (CR 10-579) (approximately 17 miles) and the length of Warm Lake Road (CR 10-579) from Warm Lake to Landmark (approximately 11 miles). Valley County also grooms Burnt Log Road (FR 447) for OSV use (approximately 9.8 miles total: 6 miles groomed and 3.8 miles of infrequently groomed). Cabin Creek Road (FS 467) is currently used during the summer and is not a groomed OSV route.

3.16.3.4 Existing Traffic Conditions

Existing vehicle traffic was determined by traffic count data collected on local roadways and at SH 55 intersections in the analysis area (HDR, Inc. 2017a,b; ITD 2017). Traffic count data was collected to record two-way road usage at nine sites from July through October from 2015 through 2016. **Table 3.16-2** summarizes the baseline traffic volumes (i.e., AADT) for key roadway segments in the analysis area.

The traffic volumes along the key roadway segments decrease with distance from SH 55. SH 55 is a public highway classified by Valley County as a principal arterial per ITD functional classification that provides for relatively high travel speeds and minimum interference to through movement (American Association of State Highway and Transportation Officials 2018; Valley County 2008a). Arterials function to move through traffic and generally link counties and cities (Valley County 2008a). Warm Lake Road (CR 10-579) has the most daily traffic of the county and NFS roads in the analysis area. Many recreational facilities are located off this road including numerous facilities near Warm Lake. Residences are spread out along Warm Lake Road (CR 10-579) within 4 miles of SH 55 and along McCall-Stibnite Road (CR 50-412) in Yellow Pine and north to Big Creek using Warren-Profile Gap Road (CR 50-340). Warm Lake Road (CR 10-579), Johnson Creek Road (CR 10-413), and McCall-Stibnite Road (CR 50-412) are considered county collector roads per ITD functional classification, which generally move traffic from local roads to the arterials or other points of interest (Valley County 2008a).

Table 3.16-2 Existing Traffic Volumes for Key Roadway Segments

Name	FR/CR Name	AADT[1,2]
SH 55	--	4,127
Warm Lake Road	CR 10-579	1,174
Johnson Creek Road	CR 10-413	57
Stibnite Road[3] (Yellow Pine to Stibnite)	CR 50-412	39
Burnt Log Road	FR 447	27
East Fork Road (South Fork Salmon River Road to Yellow Pine)	CR 50-412	84
Thunder Mountain Road[4]	FR 440	11
Horse Heaven Road[4]	FR 416W	6

Table Source: AECOM 2019; HDR, Inc. 2017a,b; ITD 2017

Table Notes:

1 Data was collected in 2015 or 2016 except for Warm Lake Road (CR 10-579) data collected in 2017. AADT is calculated by Total Recorded Count/Number of Days Recorded. All figures have been rounded up to whole numbers.

2 Average daily traffic count data provided by Forest Service for calendar year 2014 at Lick Creek Summit (35 AADT), East Fork (Eiguren Ranch) (37.8 AADT), South Fork (confluence) (34.7 AADT), Profile Summit (14.1 AADT), and Stibnite (18.1 AADT) support the data provided in Table 3.16-2 (Forest Service 2014). However, for consistency purposes, the 2015 and 2016 data collected will be used to account for traffic counts along the segments.

3 A portion of the traffic turns off onto Warren-Profile Gap Road (CR 50-340) towards Big Creek/Edwardsburg (approximately 5 to 18 vehicles between 2014 through 2016). However, for purposes of this analysis, all traffic on Stibnite Road (CR 50-412) between Yellow Pine and the mine site is considered.

4 The traffic counts are assumed to include OHVs only.

AADT = Annual Average Daily Traffic; CR = County Road; FR = National Forest System Road; SH = State Highway

South Fork Salmon River Road (FR 50674/474) is considered an NFS arterial road, which serves smaller areas and usually connects to local roads or terminal facilities. Burnt Log Road (FR 447), Thunder Mountain Road (FR 440), and Horse Heaven Road (FR 416W) are NFS local roads that connect a terminal facility (e.g., trailheads) with collector roads, arterial roads, or public highways and usually serve a single purpose involving intermittent use (Forest Service 2016).

Traffic volume in the analysis area is mainly attributed to recreational activities and residential traffic. Other activities could include fuels management, road and utility maintenance activities, and timber harvest. In addition, current traffic levels in the analysis area also can be attributed to the activities that have been ongoing since 2009 for exploration purposes, monitoring, background studies, and private property infrastructure maintenance. Traffic volume and traffic behavior vary depending on the day of the week and the season. Valley County has many summer recreational areas that attract visitors from May through October with peak levels in June, July, and August. Although the AADT is less during the winter months, winter driving conditions influence the amount of traffic (Valley County 2008a).

3.16.3.5 Vehicle Accidents

Vehicle accident data for full-size vehicles and OHVs from 2000 through 2016 was obtained from Valley County Sheriff Department records for the six roads associated with the three existing primary access routes to the mine site. Warm Lake Road (CR 10-579) experienced an average of eight accidents per year from 2000 through 2016, followed by South Fork Salmon River Road (FR 50674/FR 474) with an average of three accidents per year, Lick Creek Road (CR 50-412) with two accidents per year, Johnson Creek Road (CR 10-413) with two accidents per year, and Stibnite Road (CR 50-412) with one accident per year (DJ&A, PC 2017).

According to the Valley County sheriff's traffic incident records from 2000 through 2016, the causes of most accidents on the existing roadways fall under the general categories of driver error, vehicle mechanical issues, and environmental factors (DJ&A, PC 2017). Examples of driver error include speeding, following another vehicle too closely, inattentiveness, fatigue, gear shift issues, failure to share road, inexperience as a driver, and impairment. Examples of mechanical issues include brake and engine failure and tire-related problems including the misuse or lack of use of chains during ice or snow conditions. Environmental factors that affected traffic incidents include weather-related (e.g., snow, ice, flooding, and other conditions that contributed to poor visibility), poor road conditions (e.g., soft shoulders), and wildlife crossings.

It is likely that Warm Lake Road (CR 10-579) experiences the most accidents due to the higher traffic volumes and higher speeds observed. No OHV or motorcycle-related crashes were noted in the Valley County Sheriff's Department records; however, it is likely that not all crashes are reported (DJ&A, PC 2017).

3.16.3.6 Other Modes of Transportation

Road transportation is the primary mode of transportation in the analysis area; however, other modes also are part of the transportation network.

3.16.3.6.1 AIR TRANSPORTATION

Flying by plane is a common mode of transportation for both residents and visitors in the surrounding region. The Idaho Division of Aeronautics of the ITD and Forest Service have airstrips in the analysis area for public use. Midas Gold owns the Stibnite airstrip for private use. **Table 3.16-3** provides a summary of airports/airstrips located within the analysis area.

Table 3.16-3 Airports/Airstrips Located in the Analysis Area

Airport/Airstrip	Owner	Annual Operations[1]
Stibnite (ID41) (Private)	Midas Gold/Hecla Mining Company	NA
Johnson Creek (3U2) (Public)	Idaho Division of Aeronautics	5,720 (7/27/2017)
Landmark (0U0) (Public)	Forest Service	900 (6/23/2017)
Krassel Forest Service (24K) (Public)	Forest Service	396 (7/30/2019)
Reed Ranch (I92) (Public)	Idaho Division of Aeronautics/Forest Service	225 (7/30/2019)
Big Creek (U60) (Public)	Idaho Division of Aeronautics/Forest Service	4,004 (7/30/2019)
Cascade (U70) (Public)	City of Cascade	9,125 (7/27/2017)
McCall Municipal (MYL) (Public)	City of McCall	43,435 (7/30/2019)

Table Source: AirNav 2019

Table Notes:

1 Annual operations data represents the flights recorded for 12 months ending in date denoted in ( ).

NA = not available.

Johnson Creek airstrip is the most used airstrip in the analysis area. Small airplanes and private charter flights use this airstrip to access camping and fishing in the backcountry. Landmark is the second most-used airstrip, located on the southern section of Johnson Creek in a high mountain valley surrounded by trees. Krassel airstrip is a short airstrip located on a bluff above the South Fork of the Salmon River that is used for helicopter traffic during the summer and particularly during wildfire season. The Krassel Work Center is located east of the airstrip. Reed Ranch is the newest backcountry airstrip in the analysis area and is operated by the Idaho Division of Aeronautics through a special use permit from the PNF. This airstrip is open May 1 through October 31 (AirNav 2019). The Stibnite airstrip is administratively closed to public access though a Notice to Airmen filed with the Federal Aviation Authority (2020).

3.16.3.6.2 WATER TRANSPORTATION

Regional waterborne transportation is located north of the analysis area at the Port of Lewiston. Located approximately 135 air miles northwest of the mine site, the Port of Lewiston is Idaho's only seaport. The Port of Lewiston is the most inland seaport on the west coast and is located approximately 465 river miles from the ocean. In addition to barging, the Port of Lewiston supports multiple modes of transportation including trucks and rail (Port of Lewiston 2019). The port handles breakbulk, specialty, and roll on/roll off cargoes. Cargo shipments generally travel by barge to truck or rail destinations in Canada, Wyoming, Montana, North Dakota, and the Port of Portland (Port of Lewiston 2019).

3.16.3.6.3 RAIL TRANSPORTATION

Historically, a railroad line ran predominantly west of SH 55 from McCall south through Cascade. This segment of the line has been abandoned and the rails and ties removed. A segment of the abandoned grade extending approximately 3.5 miles south of McCall was converted to the North Valley Rail Trail (Visit McCall 2020). The Idaho Northern and Pacific line runs from Cascade south along the Payette River to Emmett and west to the Town of Payette where it connects with the Union Pacific line (ITD 2016). The Idaho Northern and Pacific line previously hauled timber products between Emmett and Cascade; however, the use of that railroad line has stopped largely due to the closure of the Boise Cascade sawmill in Cascade in 2001 and subsequent closures of timber facilities along the route (ITD 2013; Valley County 2018). The railroad mostly shipped forest products, agricultural products, and chemicals (Rio Grande Pacific Corporation 2019). The Idaho Northern and Pacific line is a subsidiary of the Rio Grande Pacific Corporation, but has its local operations based out of Emmett (ITD 2013). The Idaho Historical Railroads started a Thunder Mountain Line tour operation in 1998, originating in Cascade and traveling to Horseshoe Bend, but operation ceased in 2016 (Thunder Mountain Line 2017).

3.16.3.7 Golden Meadows Exploration

Affiliates of Midas Gold initiated mineral exploration activities in 2009 and currently use the existing road transportation network. The exploration area is accessed via the Yellow Pine Route during the summer and the South Fork Salmon River Route during the winter.

Midas Gold’s Golden Meadows Exploration Project included the construction of short temporary trails, reopening of former roads, and use of existing non-system roads to access adjacent areas of private inholdings or drill sites. These temporary roads would be reclaimed once access to adjacent areas of private inholdings is no longer required or when drilling is completed, and drill sites reclaimed.

3.17 Cultural Resources

3.17.1 Introduction and Scope of Analysis

Cultural resources consist of the physical aspects of the activities of past or present cultures, including archaeological sites, historic buildings and structures, trails, roads, infrastructure, and other places of traditional, cultural, or religious importance. Cultural resources can be human-made or natural features and are, for the most part, unique, finite, and nonrenewable.

For this analysis, cultural resources are defined using the definition in the United States Forest Service (Forest Service) Manual 2300 under Section 2360.5 as:

> *…an object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources include prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties* (Forest Service 2008).

Categories of cultural resources described in this section and analyzed in Section 4.17, Cultural Resources, include historic properties, cultural landscapes (CLs), and traditional cultural properties (TCPs). CLs and TCPs are types of historic properties. Historic properties are defined as:

> *…any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria* (36 Code of Federal Regulations [CFR] 800.16).

The National Historic Preservation Act (NHPA) Section 106 and its implementing regulations 36 CFR 800 have procedures for considering the effects of proposed federal undertakings on historic properties. The criteria for determining whether cultural resources are eligible for listing in the National Register of Historic Places (NRHP) are provided in 36 CFR 60.4. In this context, the term "historic properties" refers only to those resources that meet the criteria for listing in the NRHP and retain integrity. The National Park Service (NPS) NRHP guidance defines integrity as:

> *...the ability of a property to convey its significance. To be listed on the NRHP, a property must not only be shown to be significant under the NRHP criteria, but it must also have integrity. The evaluation of integrity is sometimes a subjective judgment, but it must always be grounded in an understanding of a property's physical features and how they relate to its significance.*
>
> *Historic properties either retain integrity (that is, convey its significance) or they do not. Within the concept of integrity, the NRHP criteria recognize seven aspects or qualities that, in various combinations, define integrity. To retain historic integrity a property will*

> *always possess several, and usually most, of the aspects. The retention of specific aspects of integrity is paramount for a property to convey its significance. The seven aspects are: location, design, setting, materials, workmanship, feeling, and association* (NPS 1995).

The NRHP criteria are defined by regulations found at 36 CFR 60.4 as follows:

> *The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and*
>
> *A) That are associated with events that have made a significant contribution to the broad patterns of our history; or*
>
> *B) That are associated with the lives of persons significant in our past; or*
>
> *C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*
>
> *D) That have yielded, or are likely to yield, information important in prehistory or history.*

While nearly all sites have the potential to yield information useful in addressing a limited number of research questions, this limited potential alone is not considered enough to qualify a site for inclusion in the NRHP under Criterion D. Federal guidelines encourage the use of a set of research questions that are generally recognized as important research goals as a means of evaluating significance. If a site contains information that is demonstrably useful in answering or refuting such questions, it can be considered a significant site under Criterion D.

In order to be a historic property, resources must meet one or more of the NRHP criteria and must retain the aspects of integrity of location, design, setting, materials, workmanship, feeling, and association. A property does not have to exhibit all seven aspects of integrity but must retain those aspects that are essential to conveying its significance. For example, integrity of association with an event or person is critical for sites that are significant under Criteria A or B, and integrity of design, material, and workmanship would be important to a building significant under Criterion C. Integrity of location, materials, and workmanship would be important for a precontact artifact scatter significant under Criterion D for its research value in understanding precontact technology and site function.

As defined by the NPS, TCPs are a distinct category of historic property eligible for listing in the NRHP due to their association with cultural practices or beliefs rooted in a living community's history and importance in maintaining the cultural identity of that community (Parker and King 1998). A TCP must be a tangible property, that is, a district, site, building, structure, or object as defined in 36 CFR 64.4 (Forest Service Manual 2360.5). Its significance must be documented and evaluated in accordance with the four NRHP criteria (Parker and King 1998).

A TCP may be a building, site, district, object, or landscape. The significance must go beyond the past 50 years yet retain ongoing significance. Although the same seven aspects of integrity are relevant, National Register Bulletin 38 (Parker and King 1998) notes that the concept of integrity is applied somewhat differently for TCPs than it is for archaeological sites:

> *In the case of a traditional cultural property, there are two fundamental questions to ask about integrity: 1) does the property have an integral relationship to traditional cultural practices or beliefs; and 2) is the condition of the property such that the relevant relationships survive (Parker and King 1998).*

CLs are defined by the NPS as:

> *A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes (Forest Service 2015; NPS 2020).*

Regulations under the NHPA and the National Environmental Policy Act provide that impacts to TCPs and CLs, if applicable, be considered in the agency's Section 106 consultation for any proposed federal agency action. The Forest Service conducts ongoing government-to-government and staff-to-staff consultation with Native American tribes (Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes) with interest in the analysis area on a regular basis. This consultation, along with additional cultural studies conducted by the tribes, was utilized to begin the process of identifying TCPs and CLs in the analysis area and potentially to mitigate impacts to TCPs, CLs, and other cultural resources of tribal interest (Battaglia 2018; Walker 2019).

As per 36 CFR 800.16(d), an area of potential effects (APE) is defined as "...the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking…" The APE defines that area within which the identification of historic properties will occur. The APE for cultural resources was established for the Stibnite Gold Project (SGP) in conjunction with ongoing consultation between the Payette National Forest (PNF) Heritage Program and the Idaho State Historic Preservation Office (SHPO) per Section 106 of the NHPA. The APE encompasses the geographic area within which the SGP may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE includes all proposed action alternative components for the SGP as outlined in Chapter 2 (see **Figures 2.3-1, 2.4-1, 2.5-1,** and **2.6-1**) plus additional buffer areas to account for potential direct visual and noise impacts.

The analysis area for cultural resources is the same as the proposed APE for cultural resources and encompasses approximately 29,500 acres (**Figures 3.17-1a-d**). The Forest Service is in ongoing consultation with the Idaho SHPO and affected tribes on the extent of the APE for Section 106 compliance (36 CFR 800.4).

For the proposed mine site, the analysis area includes a buffer out to the surrounding ridges that act as a natural stopping point for potential mining and mineral exploration activities. The buffer out to the surrounding ridges also accounts for potential visual and noise impacts at the mine site. More specifically, the cultural resources analysis area includes buffers of 100 meters on each side of the centerline of access roads to account for construction access, borrow sources, and potential visual and noise impacts, and the potential for increased public access to cultural resources in previous low-traffic areas. The analysis area along the transmission line is buffered out to 100 meters on each side of the centerline to account for potential ground disturbance during the transmission line upgrades and new construction. No buffer was used for the Stibnite Gold Logistics Facility, because it was previously intensively surveyed for cultural resources, and none were identified (Lahren 2017a); however, for two of the three proposed locations of the Landmark Maintenance Facility, a 0.25-mile buffer is included to account for potential direct visual impacts, because these areas are in close proximity to the Landmark Ranger Station, a historic property (see **Figure 3.17-1b**).

Because cultural resources are often found below the ground surface, the depth of below-ground disturbance from proposed SGP activities was used to determine a vertical dimension for the analysis area. Depth of disturbance varies with different SGP components. Certain SGP features would include foundations, excavations, and explorations that would extend below the ground surface, and some would extend into bedrock. Culturally sterile bedrock is reached at varying depths throughout the analysis area between 10 to 250 feet below the ground surface (Tierra Group 2018).

The vertical dimension of SGP impacts is considered to be approximately 70 feet below the ground surface, based on an average of the depth to bedrock within the cultural resources analysis area. Although bedrock depth may be tens of feet below the ground surface at a given location, cultural resources investigations in the analysis area typically focus on the uppermost soil horizons, because, except for subsurface historic mining features, most cultural resources are encountered within near-surface soils. Landform analysis of the geological setting and soils development would be used to further refine the probability for buried cultural resources within the vertical APE.

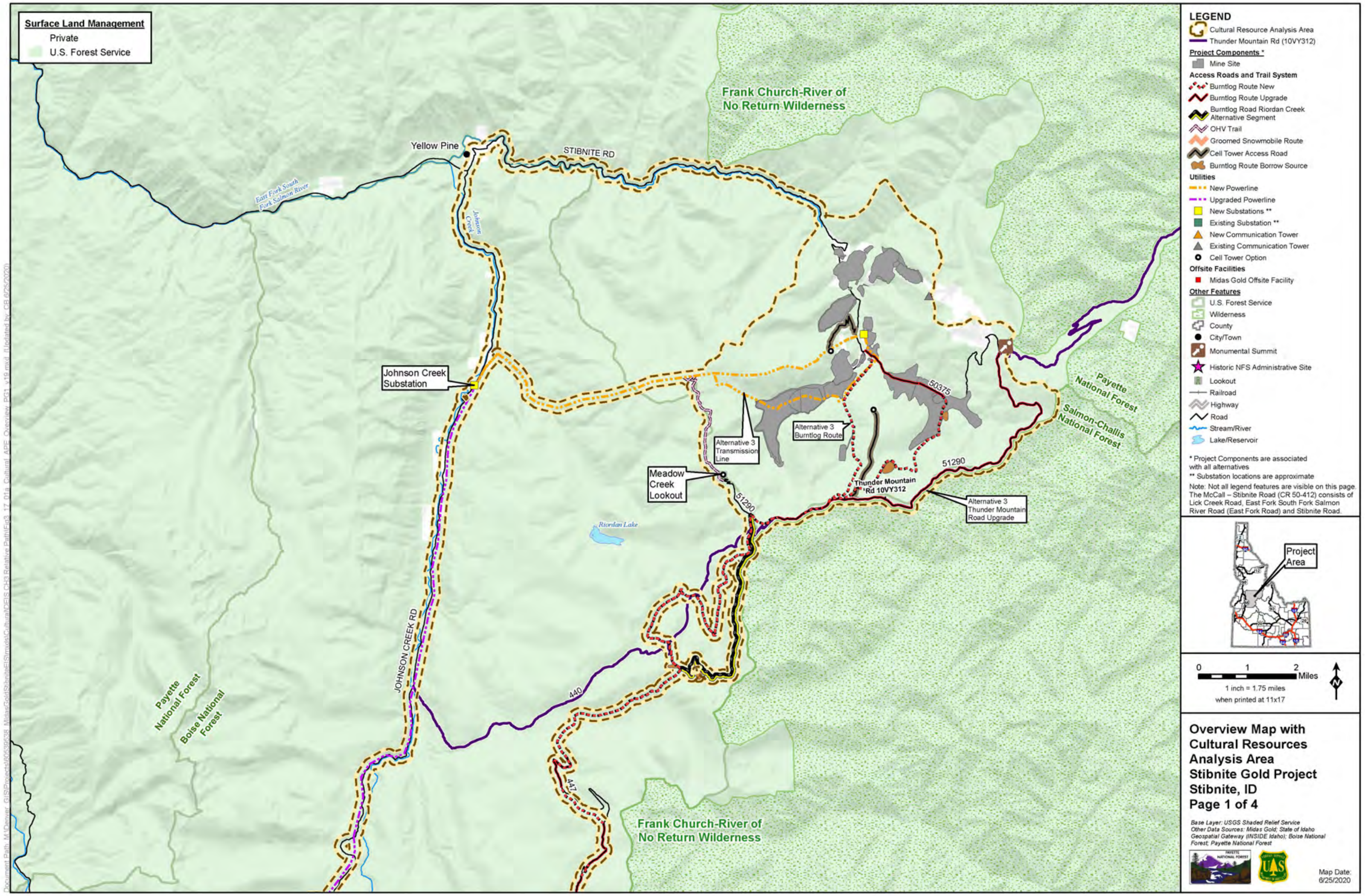

Figure Source: AECOM 2020a

Figure 3.17-1a Overview Map with Cultural Resources Analysis Area – Sheet 1 of 4

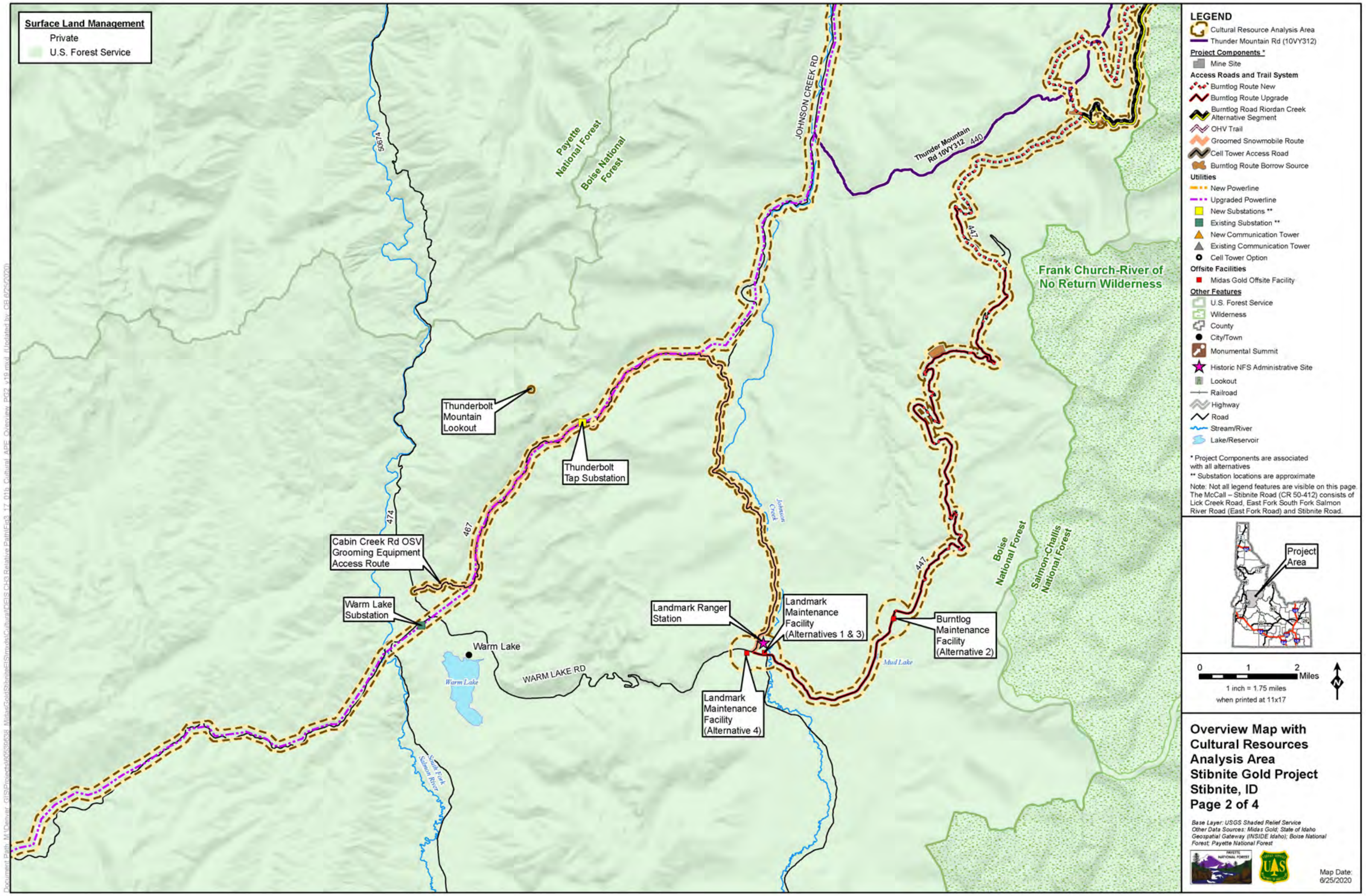

Figure Source: AECOM 2020a

Figure 3.17-1b Overview Map with Cultural Resources Analysis Area – Sheet 2 of 4

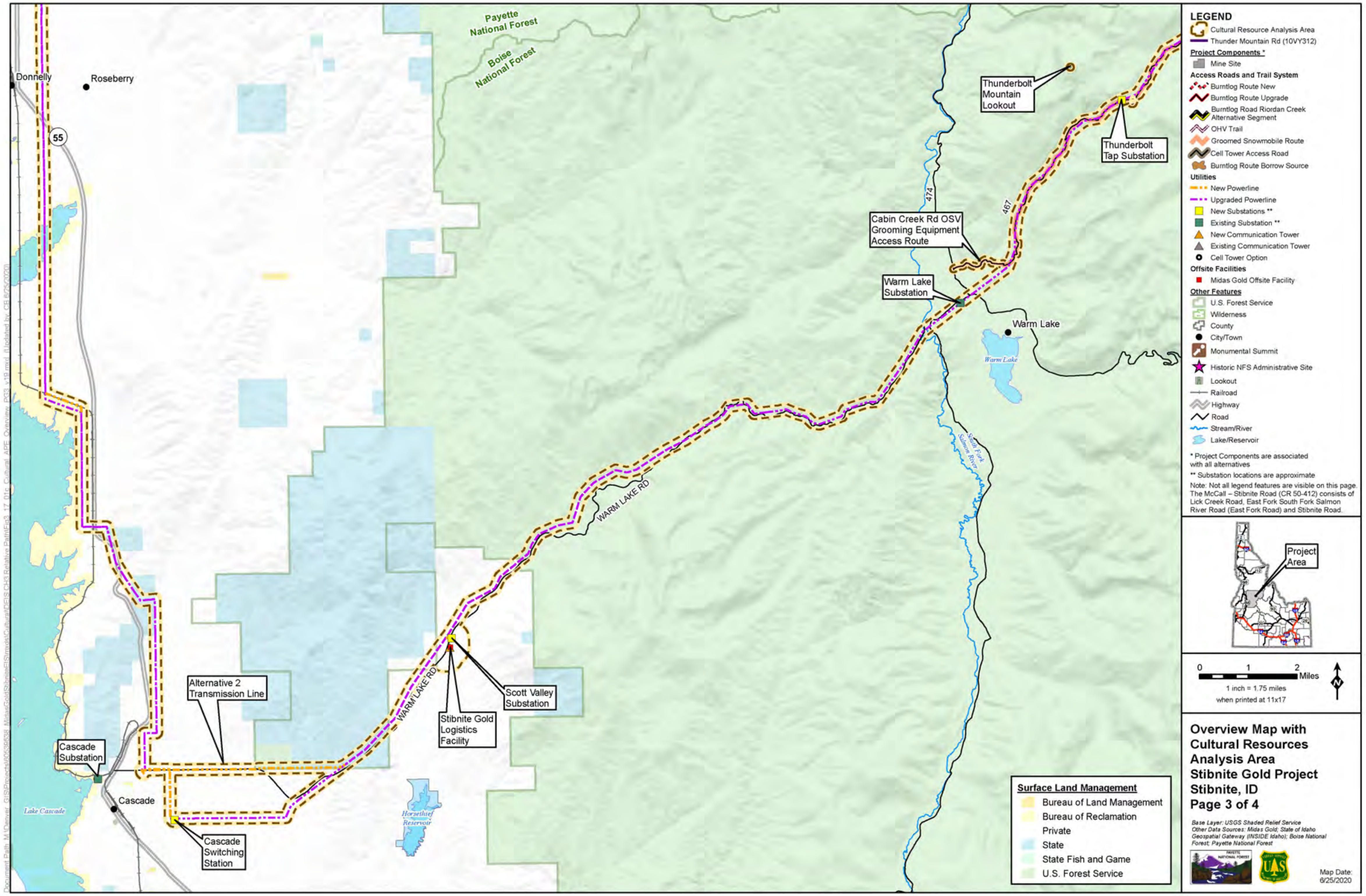

Figure Source: AECOM 2020a

Figure 3.17-1c Overview Map with Cultural Resources Analysis Area – Sheet 3 of 4

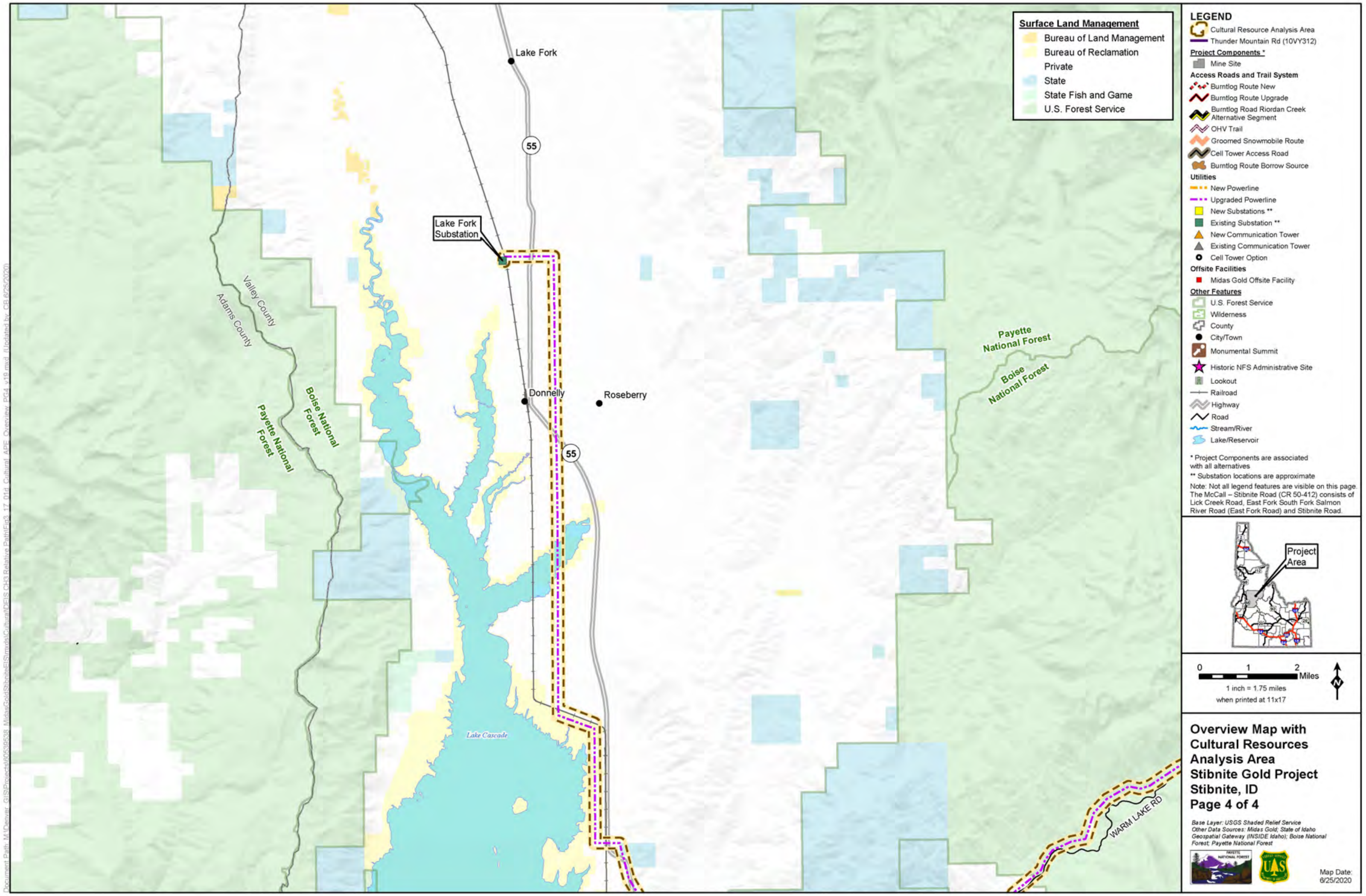

Figure Source: AECOM 2020a

Figure 3.17-1d Overview Map with Cultural Resources Analysis Area – Sheet 4 of 4

3.17.2 Relevant Laws, Regulations, Policies, and Plans

There are several federal laws and regulations applicable to cultural resources management. This section does not attempt to provide a complete listing of every law, regulation, policy, code, act, or executive order that applies to the management of cultural resources. However, it does provide a summary of the most pertinent federal and state laws, regulations, policies, and plans as they relate to the SGP.

3.17.2.1 Federal

3.17.2.1.1 NATIONAL HISTORIC PRESERVATION ACT

The NHPA of 1966, as amended through December 16, 2016 (Public Law [P.L.] 89-665, as amended by P.L. 96-515; 54 United States Code [USC] 300101 *et seq*.) is the principal federal law protecting historic properties.

Section 106 of the NHPA (54 USC 306108) directs all federal agencies to consider the effect of their undertakings (i.e., actions, financial support, and authorizations) on any historic properties. The Advisory Council on Historic Preservation (ACHP) regulations at 36 CFR 800 implement Section 106. Procedures are outlined for identifying resources; evaluating their significance; assessing effects; implementing measures to mitigate adverse effects; and consulting with the ACHP, SHPOs, Tribal Historic Preservation Offices, and other interested parties. The NRHP is used as a planning tool under these regulations to help federal agencies evaluate the significance of cultural resources. Additionally, the NHPA requires federal agencies to consult with Indian tribes to determine whether there are properties of traditional religious and cultural importance to Indian tribes that may be eligible to the NRHP (54 USC 302706).

3.17.2.1.2 NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act, as amended (P.L. 91-190, January 1, 1970, as amended by P.L. 94-52, P.L. 94-83, and P.L. 97-258; 42 USC 4321-4347) implemented by Council on Environmental Quality regulations at 40 CFR 1500-1508 requires agencies to consider the effects of proposed actions before making decisions that affect historic properties and the human environment. Under the National Environmental Policy Act, agencies must consider potential “cultural” effects as well as effects on historic properties (40 CFR 1508.8).

For the SGP, the Forest Service has determined that a Programmatic Agreement (PA) is required to ensure compliance with 36 CFR 800. A PA addresses cultural resources that may be affected by a project to minimize or resolve any potential adverse effects. A PA outlines measures for compliance with Section 106 of the NHPA, including but not limited to, protocols for the identification and evaluation of historic properties, permitting requirements, treatment of historic properties, monitoring requirements, inadvertent discovery protocols, curation, and treatment of human remains. The PA would identify known adverse effects to historic properties and provide a discussion of proposed mitigation measures that would be implemented. A PA is a legal document with signatories and concurring parties. Agency signatories, invited signatories, and concurring or consulting parties would include the Forest Service, the

U.S. Army Corps of Engineers, the Idaho SHPO, the ACHP, Idaho Power Company, Native American tribes, as well as Midas Gold Idaho, Inc. (Midas Gold). The PA will be in place prior to completion of the Record of Decision.

3.17.2.1.3 NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. Desired conditions are descriptions of how forest resources should look and function to provide diverse and sustainable habitats, settings, goods, and services. Taken together, the desired conditions should present an integrated vision of a properly functioning forest that supports a broad range of biodiversity and social and economic opportunity.

Cultural resources (i.e., Heritage Program Resources) are managed consistently with established and approved Forest Service Heritage Program Plans; Forest Service Manual 2300, Chapter 2360; and Forest Service Handbook guidance (FSH 2309.12).

Implementation of Heritage Program planning is completed to identify priority heritage assets, recommend allocation of cultural resources to management categories that reflect their primary value (i.e., cultural/traditional, scientific, interpretive, or continued use), develop historic preservation management plans, and guide implementation of compliance, protection, and stewardship activities.

The Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) regulate cultural resources (i.e., Heritage Program resources) to achieve the desired outcomes and conditions for the Heritage Program.

In addition to specific standards and guidelines, the Payette National Forest Land and Resource Management Plan and Boise National Forest Land and Resource Management Plan describe the desired conditions for Heritage Program resources in the following way:

> *People visiting the National Forest should be able to explore, enjoy, and learn about cultural heritage. As visitors travel through landscapes and experience diverse environments and cultures, they make a personal connection with the land and the people and have an opportunity to reflect on the relevance of the past and the land to their daily lives. Sites determined to be significant, under the NHPA, are inventoried, protected, and if warranted, nominated to the NRHP* (Forest Service 2003, 2010).

3.17.2.2 State and Local

3.17.2.2.1 2016 Idaho Statutes, Title 67 – State Government and State Affairs, Chapter 46 – Preservation of Historic Sites

The purpose of Chapter 46, Preservation of Historic Sites, of the 2016 Idaho Statutes is to authorize the local governing bodies of the state to engage in a comprehensive program of historic preservation.

3.17.2.2.2 Valley County Comprehensive Plan

The Valley County Comprehensive Plan has a brief section regarding “Special Areas and Sites” with one of the goals being to identify, protect, and maintain historically significant buildings and sites in the county (Valley County 2018). A partial list of sites is provided that includes “Stibnite (mining town).” The objectives associated with Special Areas and Sites include continued identification and mapping of cultural resources, promoting buffer zones around significant historical sites and buildings, and providing incentives for owners of historically significant buildings to preserve and maintain their historic buildings.

3.17.3 Existing Conditions

The cultural resources analysis area is in the upper East Fork South Fork Salmon River drainage, approximately 3 miles west of the Frank Church-River of No Return Wilderness and approximately 10 air miles southeast of the village of Yellow Pine. The mine site is situated in the Salmon River Mountains, a high-relief mountainous physiographic province in central Idaho at an elevation of approximately 6,500 feet above mean sea level with nearby mountains rising to elevations of approximately 7,800 to 8,900 feet above mean sea level.

3.17.3.1 Cultural Context

Cultural context refers to the past human groups that have used the analysis area for various purposes throughout the precontact period and the contact or historic period. More recent use of the analysis area has been related to mining (beginning in the mid-1800s), recreational activities, and traditional tribal hunting, fishing, and plant collection. A historic context of the Stibnite area was prepared for the SGP by Midas Gold (Midas Gold 2016). Additionally, the Nez Perce Tribe Cultural Department and the Shoshone-Paiute Tribes have prepared ethnographies of the analysis area (Battaglia 2018; Walker 2019). Select available information from those ethnographies is included in the context below and in Section 3.24, Tribal Rights and Interests. The Shoshone-Bannock Tribes Cultural Department is still in the process of preparing their ethnography for the analysis area, and this information is not currently available. General archaeological themes in the analysis area and vicinity include precontact archaeology, ranching, settlement, Forest Service history, traditional use, and mining.

3.17.3.1.1 PRECONTACT PERIOD

Native Americans were present in central Idaho as early as 15,000 years before the present (B.P.) (Gannon 2019). Paleoindian tools have been recovered from archaeological sites in Valley County, including a Clovis projectile point, or spearhead, in Yellow Pine during excavations for a church in 1985. Artifacts also have been found along Johnson Creek and the Middle and South Forks of the Salmon River (Woods 2002). More recent evidence of Archaic occupation in the analysis area is seen in precontact site 10VY1488, recorded in 2016. The site contains stone tool chipping debris and projectile point types that date to the Archaic period or from around 4,000 B.P. (Lahren and Pollock 2016).

Since the early systematic archaeological research work in Idaho of Swanson and Butler in the 1960s and early 1970s, a variety of precontact chronologies for Idaho have been developed by Pavesic (1978), Franzen (1981), Reed et al. (1986), Holmer (1986, 1994), Plew (2008), Meatte (1990), Lohse (1993), Roll and Hackenberger (1998), Yohe and Woods (2002), and Simms (2008). These researchers (among others) studied settlement, subsistence, technology, and cultural interaction of indigenous groups in the analysis area. These overviews provide understanding of the different degrees of cultural continuity and variability presented in the archaeological record. Plew (2008) developed a chronology that combines some of these sequences. A summary based largely on that chronology is presented below.

Paleoindian Tradition (15,000-9,000 B.P.). The Paleoindian Tradition centers on the hunting of big-game animals that became extinct during the terminal phase of the Late Pleistocene or in the early Holocene. Paleoindian people were extensively mobile and engaged in a food economy driven by the availability of big game that ranged widely across the landscape (Simms 2008). It is assumed that their diet also included small game and plants (Lohse 1993). Archaeological evidence for the Paleoindian Tradition is most clearly associated with lanceolate shaped spear points of three distinctive types – Clovis, Folsom, and Plano (Yohe and Woods 2002). Butler (1986) divided the era into three subperiods based on these three types of projectile points – beginning with Clovis, then Folsom, and finally Plano. Each period lasted approximately 1,000 years, with Plano being the longest lived and most abundantly represented Paleoindian Tradition in the region; it is found in excavated contexts as well as surface finds. Like the northwestern Plains, there is a wide diversity of generalized lanceolate projectile point forms and some milling stones (Butler 1986). Based on animal remains, the economy during this time seems to have focused on hunting bison (buffalo) at lower elevations and mountain sheep in higher elevations (Swanson 1972).

Archaic Tradition (8,000-250 B.P.). At the end of the Paleoindian Tradition nearly 8,000 years ago, environmental conditions in Idaho became warmer and drier, resulting in lifeway changes and, thus, changes in artifact assemblages, or a collection of things (Butler 1978). An important addition to the assemblage was the introduction of the atlatl and associated corner- and side-notched projectile points. In addition, material items associated with an increasingly diverse and complex hunter-gatherer society emerged (Plew 2008). Reed et al. (1986) divided the Archaic Tradition into three subperiods: Early, Middle, and Late, each lasting nearly 3,000 years. By the Late Archaic, the bow and arrow had been introduced resulting in smaller projectile point types, and there was an increase in manufacturing and use of ceramics, elaborate bone and wood tools, and basketry. In addition, during the Late Archaic, rock alignments, hunting complexes, and rock art become more varied and common (Plew 2008). Lower Johnson Creek contains several sites representative of the Early Archaic period in western Idaho (Forest Service 2010).

3.17.3.1.2 ETHNOHISTORIC PERIOD

Ancestors of the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes were the aboriginal inhabitants of this region of Idaho. The Nez Perce Tribe had one of the largest territories in present day Idaho and a relatively high population density of 5 to 12 persons per 100 square miles (Walker 1982). Their aboriginal territory covered parts of present-day Oregon, Washington, and Idaho. This area included several major river basins: the Columbia, the Salmon, the Snake, and the Clearwater (Indian Claims Commission [1961). The Nez Perce Tribe formed composite bands generally based on familiar ties, language, and territory (Idaho Centennial Commission Native Americans Committee 1992; Walker 1982). These bands lived in villages along the riverways and tributaries but traveled seasonally for subsistence. When travel was less frequent in the winter, the Nez Perce Tribe lived in longhouses. Teepees were used during more active traveling seasons, such as spring and summer. Anadromous fish, such as Chinook salmon, roots, such as camas, and a variety of game were, and continue to be, important subsistence resources (Hunn et al. 1998; Nez Perce Tribe 2019, 2020).

The Northern or Snake River Shoshone and Bannock occupied an area generally along the Snake River Plain, but their territory also included most of southern Idaho, western Wyoming and Montana, and south into Nevada and Utah (Idaho Centennial Commission Native Americans Committee 1992; Murphy and Murphy 1986; Walker 1982). The northern portion of their territory in Idaho included present day Adams and Valley counties. Population densities of this composite group ranged from 1.5 to 2 individuals per 100 square miles (Walker 1982). The four Northern Shoshone Bands divisions included: (1) the Western Shoshone (Waareekas), including the Boise and the Bruneaus; (2) the Mountain Lemhi Shoshone, including the Tukuerukas (Sheepeaters) and the Agaidikas (Salmoneaters); (3) the Northwestern Shoshone, including the Bear Lakes, Cache Valley, Bannock Creek, and Weber Ute; and (4) the Pohogue (Fort Hall) Shoshone (Forest Service and Bureau of Land Management 1997).

The Shoshone-Bannock Tribes traveled seasonally to collect plants and to hunt. The Shoshone-Bannock Tribes also traveled in and collected resources throughout central Idaho's Salmon River Mountains, among other areas (Forest Service 2003; Murphy and Murphy 1986). Their camps were sited near water, and items were often left at the campsites to share with others who may need them. Important animals and plants for subsistence included salmon, deer, elk, moose, mountain sheep, buffalo, various nuts, seeds, berries, and roots, such as camas. Small game animals, including, groundhog, jack rabbit, porcupines, and prairie dogs, also were used extensively (Idaho Centennial Commission Native Americans Committee 1992; Walker 1982, 2019).

Ancestral bands of Western Shoshone and Northern Paiute traveled in small groups over a vast territory centered around southern Idaho, northern Nevada, and southeastern Oregon (Fowler and Liljeblad 1986; Thomas et al.1986). The Northern Paiute lived in two major bands in territories centering on the upper Snake and Owyhee Rivers, respectively. They used many of the same fishing and camas collection areas as the Shoshone-Bannock Tribes, and their population density was the same as the Shoshone-Bannock Tribes' at 1.5 to 2 people per 100 square miles; however, groups rarely exceeded 50 individuals. The arid Paiute territory contained fewer subsistence resources than the Shoshone-Bannock Tribes' territory, except in the river valleys (Walker 1982). They necessarily relied more on plant foods, such as sunflowers, wada seeds, currants, and huckleberries, plus small animals and insects. Much time was spent pursuing food based on seasonal cycles. In May, they left winter villages to gather roots and prepare salmon traps. At the end of the salmon runs, people dispersed to hunt and collect plants and insects. Communal rabbit and antelope drives and wada seed gathering occurred in early fall. By November, food had been stored, and the people returned to the winter villages. Homes were typically conical frame structures with tule mat coverings, but domed earth covered structures were used as well, along with temporary shelters, such as tripodal framed structures and caves, in the summer (Walker 1982, 2019). More detailed tribal histories are provided in Section 3.24, Tribal Rights and Interests.

3.17.3.1.3 CONTACT OR HISTORIC PERIOD

The contact period is generally defined as beginning with the first Euroamerican and Native American contact. For this area, the Lewis and Clark Expedition of 1805 is most often referenced. Lewis and Clark's Corps of Discovery precipitated an era of rapid Euroamerican exploration and settlement, which advanced regionally with the arrival of early explorers, fur traders, and missionaries. Circa 1810, British and American fur trading posts were being established throughout the Pacific Northwest. However, contact was still limited in the remote mountains of central Idaho, but there were several meeting places known to the Euroamerican settlers and frontiersmen in Valley County, including an annual summer meeting at the north shore of Payette Lake where various tribal peoples, including the Shoshone and the Nez Perce of the lower Salmon River, gathered. In 1877, a local frontiersman (John Hughes) observed:

> *In this valley there are each summer one thousand to fifteen hundred Indians, consisting of Indians from the Lapwai Reservation, Salmon River, Sheepeaters from the South Salmon, the Indian Valley band under Eagle Eye, Indians from Fort Hall Reservation, some Cayuses and Umatillas from Washington Territory, Joseph's band from the Walou [sic] valley and a few from the Malheur and Owyhee* (Chaffee 1936 in Woods 2002).

Seasonal camps have been documented along Johnson Creek and at Riordan Lake southwest of the Stibnite mine site (Forest Service 2010). By 1900, most members of the Nez Perce Tribe, the Shoshone-Bannock Tribes, and the Shoshone-Paiute Tribes lived on reservations away from the mountains of central Idaho (Forest Service 2003). The analysis area is still used by and of interest to these tribes (Battaglia 2018; Forest Service 2003, 2010; Walker 2019). More detailed tribal histories are provided in Section 3.24, Tribal Rights and Interests.

The communities of Yellow Pine and Roosevelt, as well as ranches along Johnson Creek, were first established in the early 1890s to support the mining boom in the nearby Big Creek area and the Thunder Mountain gold rush of the mid-1890s (Forest Service 2015). Initial reports from the gold deposit at Thunder Mountain (the Dewey Mine) were very favorable, and, in 1902, its promise lured over 2,000 prospectors. They arrived and set up shop between 1902 and 1906, creating the boom town of Roosevelt primarily with financing from Pittsburgh, Pennsylvania, investors. Thunder Mountain Road was established along a Native American travel corridor at this time to access Roosevelt from Emmett via Long Valley. The wagon road was organized by Mr. Dewey of the Dewey Mine, who died before he could see the route completed to Roosevelt in 1904 (Woods 2002). The mining boom at Thunder Mountain was short lived, as initial reports of the gold deposits were highly exaggerated. Mining ceased altogether in 1909 when a mudslide caused flooding and the subsequent evacuation and destruction of the community of Roosevelt. Thunder Mountain had a brief resurgence for a few years with an open pit at the Dewey Mine after gold prices had increased and access had been improved in the 1930s (McKay 2011).

The first work in the Stibnite-Yellow Pine Mining District[1] (Mining District) may have occurred as early as the 1860s, but the Stibnite area was not developed until after the turn of the 20th Century (Forest Service 2015). Though ore deposits were discovered in the Stibnite area during the early 1900s in conjunction with the Thunder Mountain gold rush, Stibnite was more remote than other areas in the Mining District, and, with the technology of the times, the gold and silver were difficult to separate from the antimony-gold-silver ore that was prevalent in the area.

Consequently, little mining occurred in Stibnite until World War I when antimony became a needed commodity in the production of aluminum for the war effort (Bailey 1979; Forest Service 2015). Even with the World War I demand for antimony, Stibnite was not developed on a large scale until around 1927 when the F.W. Bradley Company purchased the mining claims and much of the property (McKay 2011; Petersen 1999).

The U.S. Bureau of Mines and the U.S. Geological Survey conducted mineral exploration drilling work from 1939 to 1941, pursuant to the Strategic and Critical Materials Stock Piling Act of 1939. After the war, the government continued to play a significant role in ensuring the continued production in the area through at least two exploration loan contracts from the Defense Minerals Exploration Administration. The Defense Minerals Exploration Administration was a program within the Interior Department established in 1951 that facilitated exploration for critical and strategic minerals through loans.

There were two primary periods of heavy production in the Stibnite area: 1) a period encompassing World War I and World War II, which ended in the 1950s and 2) a period that began with exploratory activities in 1974 with intentions to re-open the historic mines, which led to open pit mining and seasonal on-off heap leaching through the 1990s (Midas Gold 2016).

[1] Not to be confused with the smaller NRHP-listed Stibnite Historic District.

The community of Stibnite was established in the 1920s and substantially boomed during World War II when it swelled to a peak population of 1,500 permanent residents. By then, the residents of Stibnite had constructed a school, numerous houses, a hospital, a community recreation center, bunkhouses, a mechanic's shop, and a post office (Bertram 1986). The post office was established in Stibnite in 1927 with Harold D. Bailey as postmaster (Bailey 1979; Woods 2002). The community's name was chosen because the town names of Meadow Creek and Bradley were already taken when Bailey applied for a post office (Bailey 1979). Stibnite is an antimony sulfide, and the largest known deposits of that sulfide in the U.S. are found in the Stibnite-Yellow Pine Mining District (McKay 2011).

During World War II, the Stibnite mines were one of the nation's leading producers of minerals needed in the war effort, including antimony and tungsten. The mines produced an estimated 90 percent of the nation's domestic supply of antimony and 40 percent of its tungsten supply during this boom (Bertram 1986). Initially, ore was mined underground in the Meadow Creek Mine (in the Hangar Flats area), with the mill located adjacent to the mine site and tailings disposed of in the Meadow Creek Valley. Following the discovery of antimony and tungsten ore in the Yellow Pine pit area in the 1930s, underground mining, initially, and subsequently open pit mining commenced in this area with waste rock deposited nearby (the Bradley dumps), ore processed at the mill, and tailings disposed of in the Meadow Creek valley. Extensive underground workings also were developed during this era. By the end of the war, tungsten deposits were played out, and the mine continued with low-grade antimony and gold, but it was no longer profitable (Forest Service 2015). A new smelter was built to increase profitability, but it did not work properly; its failure was followed by a series of setbacks, including fires and harsh winters. By June 1952, production had ended, and, in 1957, mine operations ceased altogether. Beginning in 1954, homes and community buildings were abandoned or moved to Cascade, Yellow Pine, or McCall; the school closed; and the post office was moved to Yellow Pine (Bertram 1986; Hart 1979; Mitchell 2000; Petersen 1999; Woods 2002).

In the 1970s, Ranchers Exploration and Development Company leased part of the mine at Stibnite, and plans were made to reopen it, but nothing happened until a decade later when Ranchers Exploration and Development Company merged with Hecla Mining Company and continued development work for a few more years. At the time, Hecla Mining Company negotiated a deal with Pioneer Metals to use their leach plant at Stibnite, and, by 1988, Yellow Pine Mine at Stibnite was producing the third-largest amount of gold in the state from open pit oxide ores mined in the Homestake area (northeast of the Yellow Pine pit) and at West End (Mitchell 2000). Waste rock from these operations was dumped close to these pits.

Throughout the 1980s and 1990s, several companies operated heap leach gold and silver facilities in the area around Meadow Creek near the former Stibnite mill and smelter location. Some of these leach pads have since been covered with fill, while the Hecla leach pad remains stacked with leached ore. Work under several different mining companies continued intermittently until 1997. This work left a deposit over 50 feet deep of spent heap leach ore in an area now known as the Spent Ore Disposal Area, on top of the Bradley tailings. Exploration and evaluation work did not occur again until 2009 when affiliates of Midas Gold began exploration work in the Hangar Flats area (Midas Gold 2016).

3.17.3.2 Cultural Resource Investigations

Record searches of the analysis area were conducted by the respective PNF and Boise National Forest (BNF) Heritage Program staff. Presented below is a discussion of the archaeological investigations conducted to-date by the PNF and BNF in the analysis area. The surveys related to the SGP, as well as other BNF surveys, are shown on figures in **Appendix L.**

In April of 2012, Lahren, an archaeological contractor for Midas Gold, requested a records search (#12221) from the Idaho SHPO to determine the presence or absence of previously recorded archaeological sites and the extent of survey coverage in and within 1 mile of the 2012 survey area. The results of the 2012 SHPO records search were used, along with the results of the updated PNF and BNF records searches, to determine the number of investigations that have occurred in the analysis area. In total, 53 archaeological investigations have been completed within the analysis area. Many of these investigations were conducted for the SGP by the Forest Service and Lahren, and several were conducted by various agencies and contractors for timber sales and other common Forest Service activities, such as trail maintenance and fencing.

The most recent archaeological investigations in the SGP area occurred in 2018 and 2019 when AECOM conducted a re-evaluation of the Stibnite Historic District (Historic District); a survey of the 38.2-mile proposed Burntlog Route and the 5.3-mile Riordan Creek alternative alignment under Alternative 2; and limited testing of a precontact site to determine the presence or absence of artifacts and a more accurate site boundary. The final report of that fieldwork (AECOM 2020b) was submitted to the Idaho SHPO by the Forest Service. The Idaho SHPO responded with a concurrence letter on June 30, 2020 (Johansson 2020).

Overall, the 53 archaeological surveys conducted within the analysis area have generally been intensive level with transects spaced no more than 30 meters apart, although some areas were subject to reconnaissance surveys due to steep and unsafe terrain or due to extensive previous disturbance from forest fires and past mining activities. In total, of the approximately 29,500-acre analysis area, approximately 5,400 acres have been intensively surveyed with transects spaced no more than 30 meters apart, and approximately 2,400 acres have been reconnaissance surveyed.

3.17.3.2.1 Cultural Resources

As a result of the previous surveys, a total of 39 resources, including archaeological sites and above-ground historic resources, have been recorded in the analysis area. However, since the time they were recorded, 5 of those resources have been destroyed by forest fires, development on private land, or dam failure in the case of Blowout Creek earth-filled dam, leaving 34 resources in the analysis area. Of the 34 previously recorded resources in the analysis area, 6 are considered historic properties (resources that are listed on or eligible for listing on the NRHP). The remaining 28 previously recorded sites within the analysis area have been determined not eligible for inclusion in the NRHP by the Forest Service, as concurred with by the Idaho SHPO, and, therefore, require no further management.

The six known historic properties in the analysis area include the NRHP-listed Stibnite Historic District and five NRHP-eligible resources (a precontact site, a historic road, a historic transmission line, a Forest Service lookout, and a Forest Service ranger station). The Forest Service also has identified the Thunderbolt Mountain Lookout as a potential historic property due to its age and history, although it has not been formally documented at this time.

Each of these historic properties, including its assigned site number, is briefly described below:

- Stibnite Historic District (87-001186) – The Historic District consists of a World War II strategic metals mining area with six contributing elements dating from 1939 to 1945. The Historic District boundary includes all patented mining claims in the mine site area. It was nominated to the NRHP by Idaho SHPO in 1986 (Bertram 1986) and listed on the NRHP in 1987 for its contributions to the war effort (under Criterion A). The Historic District was nominated to the NRHP by J. Bertram of Idaho SHPO in 1986 (Bertram 1986).
- Precontact Site (10VY1488) – This archaeological site, known as the “Stibnite lithics site,” is an archaic-era lithic scatter that was recorded in 2015 (Lahren and Pollock 2016) and further delineated in 2018 (AECOM 2020b). The site is eligible for the NRHP, because it has important information potential for understanding central Idaho’s prehistory.
- Old Thunder Mountain Road (FR 440) (10VY312) – This linear resource was first an important Native American travel route and later the alignment of a historic wagon road completed in 1904 that extended from Emmett, Idaho, via Cascade, to Roosevelt, Idaho, to access the Thunder Mountain mines (Dixon 2010; Simpson and Cox 1979; Woods 2002).
- Meadow Creek Lookout (10VY365) – This standard R4-80-style lookout house with a shed was built in 1933 on the top of Riordan Peak. It is significant for its association with the Forest Service’s early conservation movement and as a fine example of New Deal-era architecture (Osgood 2007).
- Landmark Ranger Station (10VY476) – This Forest Service administrative site was built between 1924 and 1942 and is significant for its association with important events in Idaho and Forest Service history. It is an outstanding example of pre-New Deal architecture that reflects early Forest Service standard design plans (Osgood and Willis 2009).
- Idaho Power Company Line 328 (IHSI 85-18148) – This 113-mile-long electrical transmission line was built in 1943 from Emmett, Idaho, to serve mining operations at the Stibnite Mine. Idaho Power Company recorded this line in 2017 and determined it was significant for its World War II association (Valentine 2013).
- Thunderbolt Mountain Lookout – This lookout consists of a two-story flat cabin built in 1962. The lookout is not currently recorded as a historic property, but the Forest Service has identified it as a potential historic property due to its age and history.

Non-confidential historic property locations are shown on **Figures 3.17-2a** through **3.17-2c**. These include the Stibnite Historic District, the Landmark Ranger Station, Meadow Creek Lookout, Old Thunder Mountain Road, and Idaho Power Company Line 328. The location of the potential historic property, Thunderbolt Mountain Lookout, also is included on **Figure 3.17-2c**. These sites are not confidential, because they are displayed on public maps or, in the case of the Stibnite Historic District, listed on the publicly available NRHP.

Other previously recorded historic property locations are not shown, because archaeological resources can be damaged or destroyed through uncontrolled public disclosure of information regarding their location. Because this Environmental Impact Statement is a public document, sensitive information regarding the location of archaeological sites is not disclosed. Information regarding the location, character, or ownership of a historic resource is exempt from the Freedom of Information Act pursuant to 54 USC 300101 (NHPA) and 16 USC 470hh (Archaeological Resources Protection Act).

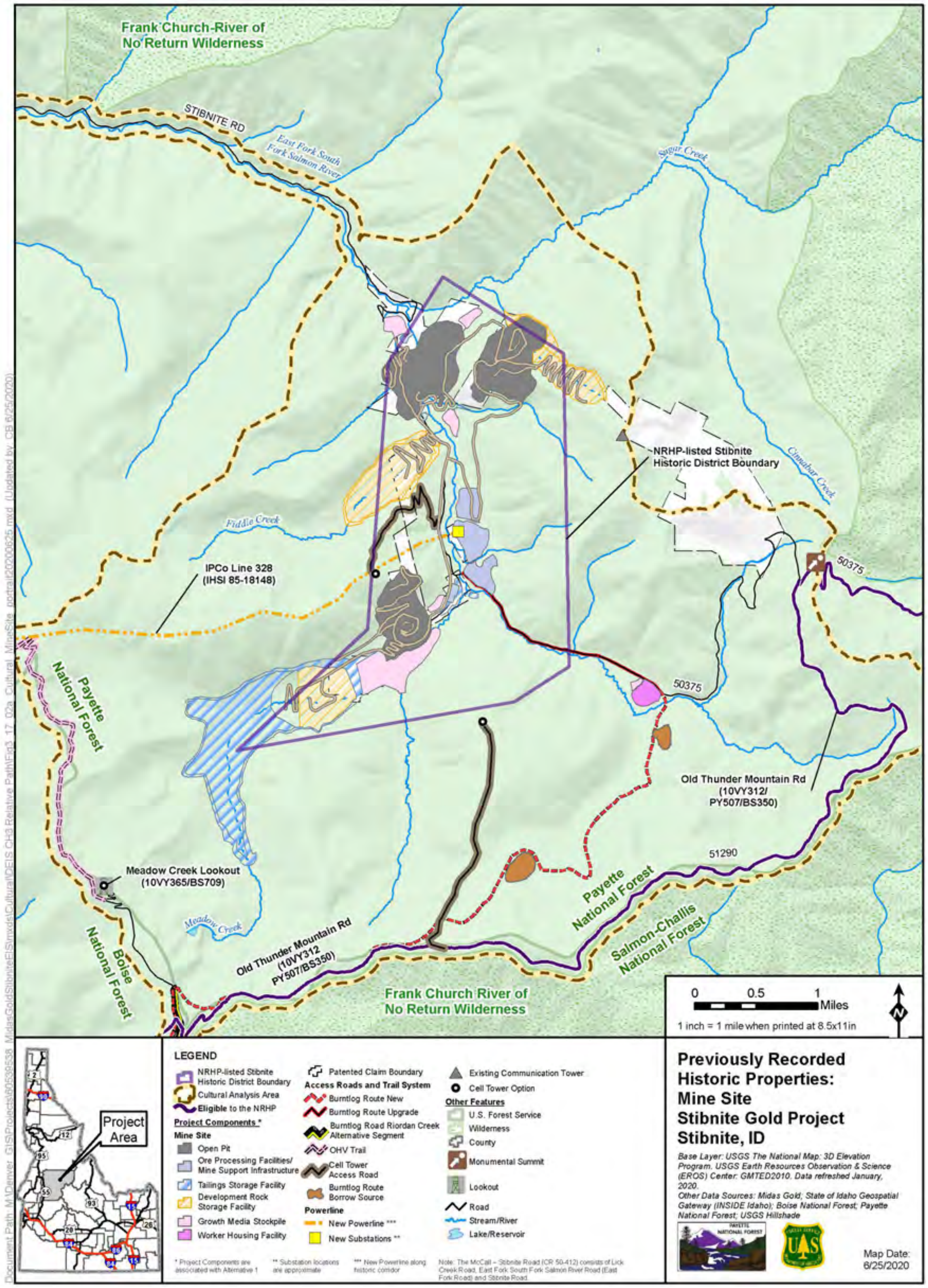

Figure Source: AECOM 2020a

Figure 3.17-2a Previously Recorded Historic Properties: Mine Site - Sheet 1 of 3

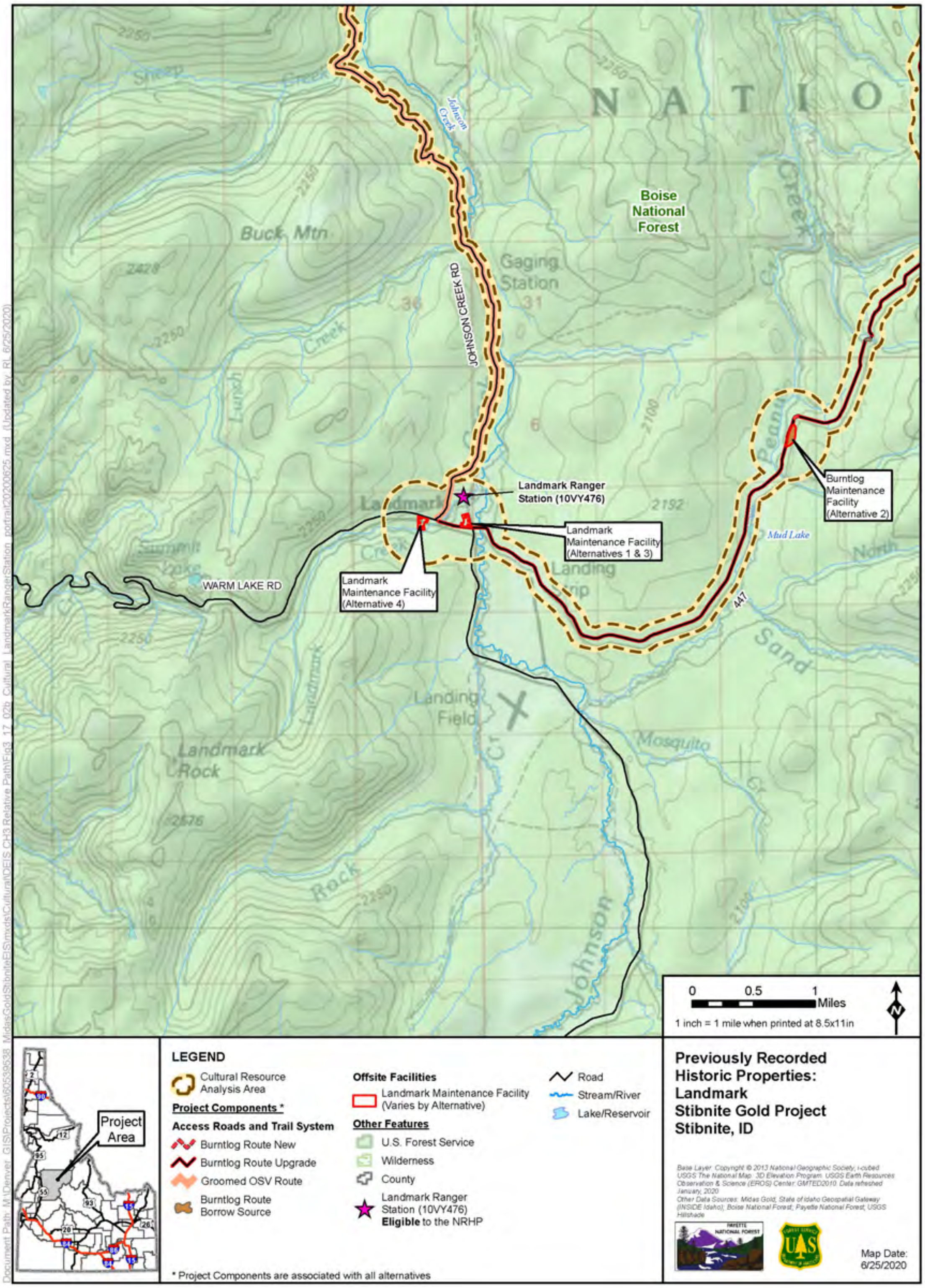

Figure Source: AECOM 2020a

Figure 3.17-2b Previously Recorded Historic Properties: Landmark – Sheet 2 of 3

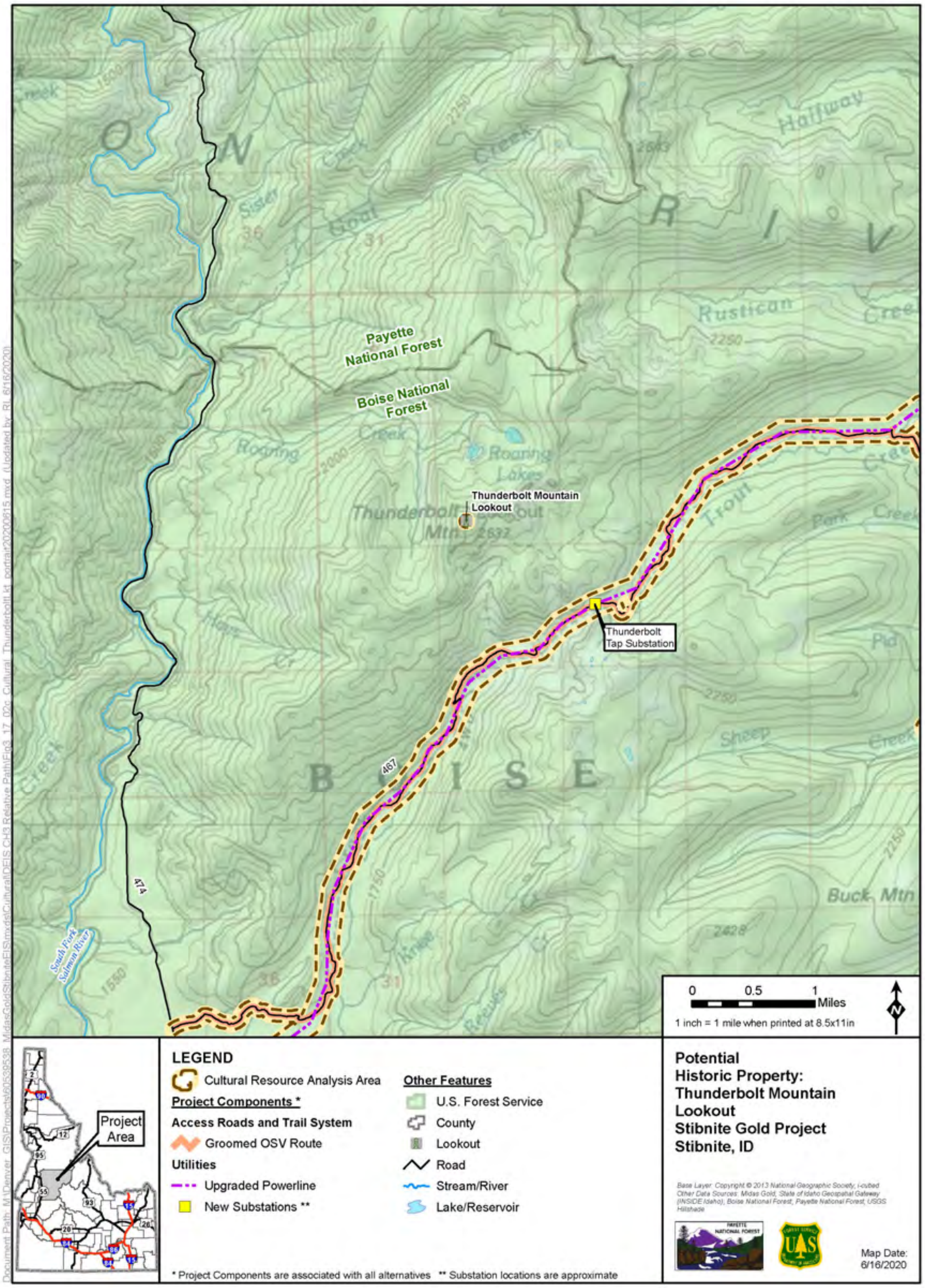

Figure Source: AECOM 2020a

Figure 3.17-2c Potential Historic Property: Thunderbolt Mountain Lookout – Sheet 3 of 3

Brief descriptions of the Historic District and Old Thunder Mountain Road are provided below, because these historic properties play a major role in the precontact and contact history of the SGP area.

3.17.3.2.1.1 Stibnite Historic District (National Register ID No. 87001186, State Site Number 10VY457)

The NRHP-listed Historic District is often referred to as the Stibnite Mining District, which is sometimes used interchangeably with the Stibnite-Yellow Pine Mining District, although the actual Historic District only includes mines at Stibnite and not the entire Mining District. The Historic District was listed on the NRHP in 1987 under NRHP Criterion A for its role in supplying the “strategic metals” antimony and tungsten for World War II. Six sites recorded in the 1980s (10VY253/PY-412, 10VY254/PY-413, 10VY256/PY-415[2], 10VY261/PY-420, 10VY262/PY-421, and Yellow Pine Mine [SMP-2 and SMP-3]) were included as contributing elements of the Historic District on the NRHP nomination form (Bertram 1986).

Since the mid-1980s recording, the sites within the Historic District have deteriorated through weathering, scavenging, modern mining development, and fires. Later recordings of Yellow Pine Open Pit Mine (SMP-2) and Glory Hole Pit (SMP-3) indicated that there were four deteriorated ore sorting and crushing structures associated with the Yellow Pine Mine still partially existing. However, these structures have deteriorated to a point that they no longer retain their historic integrity. Due to past salvaging (the residences were moved to McCall, Cascade, Yellow Pine and other nearby towns), natural deterioration (including fire and snow), modern mining prior to 1997, and environmental remediation activities that followed the modern mining, all sites contributing to or associated with the Historic District now lack integrity, because they are either completely gone or have only very minimal foundation remnants and some scattered artifacts (Lahren 2017b). Therefore, Idaho SHPO reconsidered the individual sites contributing to or associated with the Historic District and subsequently concurred that those sites are no longer eligible for listing in the NRHP under NRHP Criteria A, B, and C (Davis 2012; Lahren 2017b).

Recent archaeological survey work (AECOM 2020b) in the Historic District was conducted to determine if the Historic District was eligible under the final NRHP criterion (Criterion D) as per Forest Service and SHPO recommendations (Witkowski 2018). This work concluded that all available information has already been gleaned from the physical remains of the sites and is available in the written records such that information potential no longer exists. Therefore, the individual sites and the Stibnite Historic District are no longer eligible under Criterion D. The Forest Service concluded that the Stibnite Historic District no longer retains significance under any criteria and could be delisted from the NRHP. Idaho SHPO concurrence with this determination is pending additional Forest Service documentation.

[2] This site has been destroyed by forest fire.

3.17.3.2.1.2 Old Thunder Mountain Road (FR 440) (State Site Number 10VY312)

Old Thunder Mountain Road (FR 440) was established as a freight wagon road along a Native American travel corridor between 1902 and 1904 to access the Thunder Mountain Mines. The route began in Emmett, Idaho, and ran to the mining boom town of Roosevelt via Long Valley.

The wagon road was organized by Mr. Dewey of the Dewey Mine (Woods 2002). The route saw steady use during the Thunder Mountain Gold Rush until 1907 (Simpson and Cox 1979). It was later used for hauling ore out of Stibnite and other mines in the area, and portions are still in use today (Dixon 2010). However, the road has been extensively upgraded, and much of the old alignment is no longer discernable. Forest Road 440 is now maintained as an All-Terrain Vehicle trail. The road maintenance was left to Idaho and Valley counties and later taken over by the Forest Service. Following this, the Forest Service rerouted the road into the Landmark-Yellow Pine-Cinnabar Road (Woods 2002). The road is considered eligible under Criterion A for its role in the transportation and mining history of Idaho (Simpson and Cox 1979). However, it also is an important cultural resource to the tribes with interests in the area and was mentioned in both the Nez Perce Tribe and the Shoshone-Paiute Tribes ethnographies as a resource of concern (Battaglia 2018; Walker 2019).

3.17.3.2.2 Traditional Cultural Properties And Cultural Landscapes

Ethnographic studies have been completed for the SGP by the Nez Perce Tribe (Battaglia 2018) and the Shoshone-Paiute Tribes (Walker 2019) to assist in identifying TCPs and CLs, as defined by the NPS. Preliminary results of the Nez Perce Tribe's ethnography indicate areas and resources that the Nez Perce Tribe is most concerned with and indicate a potential for TCPs and/or CLs to exist in the analysis area. However, specific TCPs or CLs, as defined by the NPS (NPS 2020; Parker and King 1998), are not currently disclosed. The Forest Service is in ongoing consultation with tribes on how to appropriately publicly disclose information presented in tribal ethnographic studies that identified potential TCPs or CLs within the analysis area for cultural resources. The Shoshone-Paiute Tribes' ethnography is framed as a broad overview of their cultural connection to the analysis area and does not go into specific locations of TCPs of CLs. The Shoshone-Bannock Tribes Cultural Department is still in the process of preparing their ethnographic work for the SGP, and that information is pending.

Currently, for the purposes of this Environmental Impact Statement, there are no formally documented TCPs or CLs within the analysis area for cultural resources. The PA will include steps for identifying TCPs and CLs and a management plan for any such resources identified.

3.18 PUBLIC HEALTH AND SAFETY

The World Health Organization (WHO) defines “health” as: “A state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity” (WHO 1946). Public health is the science of protecting and improving the health of families and communities through promotion of healthy lifestyles, research on disease and injury prevention, and detection and control of infectious diseases. Public health is concerned with protecting the health of entire populations; these populations can range from local neighborhoods to entire regions of the world. Public health also works to limit health disparities by promoting healthcare equity, quality, and accessibility. Public health addresses incidences and death rates for infectious and chronic diseases or other health conditions, including mental health. It can be affected by demographics (e.g., education, ethnicity, gender, socioeconomics, and minority status), the availability of health care services, physical environment, and prevalence of behavioral and social problems (e.g., substance abuse, obesity, and physical inactivity). For this analysis, public health is related to the overall physical health and well-being of the local populations.

Public safety refers to the welfare and protection of the public. Most states have departments of public safety. In many instances, public safety departments are composed of organizations, such as police, fire, and emergency medical services. In the context of this analysis, public safety is primarily related to the incidence of accidents that might lead to injuries and deaths. Injuries include unintentional injuries (e.g., motor vehicle accidents and falls) and intentional injuries (e.g., homicide and suicide). Such injuries can place a significant burden on available local public resources in a community. Safety can be affected by the prevalence of behavioral and social problems, availability of a police force and fire department, availability of safe transportation, and weather conditions.

This section describes the affected environment prior to initiation of the proposed Stibnite Gold Project (SGP) as it relates to the health and safety of the public that utilize lands that may be impacted by the SGP. The analysis follows National Research Council (2011) and North American Health Impact Assessment Practice Standards Working Group (2014) guidelines for assessing public health and safety impacts of potential projects.

3.18.1 Scope of Analysis

Due to the nature of a large mining project and within the context of public health and safety considerations, the analysis area consists of: Valley County and associated local population, particularly the residents of the village of Yellow Pine, the nearest residential community to the proposed mine site; Payette National Forest (PNF) Management Area 13 (Big Creek/Stibnite); Boise National Forest (BNF) Management Areas BNF 21 (Lower Johnson Creek), BNF 20 (Upper Johnson Creek), BNF 19 (Warm Lake), BNF 17 (North Fork Payette River); and associated recreational visitors, including adults and children, who frequently camp, hike, or engage in other recreational activities in these areas. The scope of this analysis is limited to the affected communities outside of the mine site and associated facilities. Accordingly, this analysis does not include a direct evaluation of the anticipated workforce safety and health issues that could occur at the proposed mine site or off-site facilities. The SGP would be governed by the Occupational Safety and Health Association (OSHA) and Mine Safety and Health Administration (MSHA) regulations in the areas where mining and mining-related activities would occur. This analysis does consider “crossover issues,” such as health issues for which workforce behaviors result in interactions/overlap with the affected communities. Some baseline data may not differentiate between workers and non-workers (e.g., traffic accidents) and hence, may indirectly evaluate worker health and safety. In particular, baseline data for traffic accidents applies to all travelers along roadways, including worker and non-worker populations. Similarly, some impacts to workers (e.g., catastrophic related event) may affect available community health resources and indirectly affect potential for health effects.

The National Research Council guidance lists five general categories that should be addressed as part of a public health evaluation to systematically select the issues that need to be addressed for a project. These five categories are: environment, economy, infrastructure, services, and demographics. Five types of health impacts are assessed for each area (National Research Council 2011):

- Chronic Disease: For the purposes of this evaluation, chronic diseases are health conditions that persist for long periods of time (i.e., 3 months or longer) and are non-communicable, such as heart disease, cancer, or asthma.
- Infectious Disease: Infectious diseases are associated with viral, bacterial, or microbial infections and are commonly transferred from person to person through direct contact, such as influenza.
- Injury: Unintentional or accidental event resulting in injury or trauma, such as a car accident or fall.
- Nutrition: Impacts to health (positive or negative) associated with diet.
- Well-being/psychosocial effects: Well-being and psychosocial effects consider the social and cultural well-being of the populations.

To facilitate evaluation of potential impacts of the SGP, it is necessary to understand baseline health conditions of the potentially affected communities. The baseline represents existing health conditions and provides a basis against which the potential impacts to human health from the SGP can be compared and evaluated. Baseline health statistics were obtained from the U.S. Census Bureau (Census 2010) and the Valley County health rankings (County Health Rankings and Roadmap 2019).

3.18.1.1 Environment and Public Health

As it relates to public health, impacts to the environment are typically evaluated based on potential impacts to various environmental media (i.e., air, soil, groundwater, and surface water). This analysis focuses on whether hazardous pollutants could be emitted by activities of the SGP and enter environmental media at levels that could be a health concern. Health concern is evaluated by considering the amount of human exposure to potentially impacted environmental media. Human exposure to environmental media can occur through several pathways of exposure (e.g., inhalation of vapors or particulates in air, incidental ingestion or skin contact with impacted soils, and ingestion or skin contact with impacted groundwater or surface water).

In addition to hazards from pollutant-impacted environmental media, the existing terrain and characteristics of the environment can present certain natural hazards to public health and safety, such as:

- Steep terrain and rock cliffs
- Avalanches and landslides
- Flash floods and water hazards
- Wildfires.

3.18.1.2 Economy and Public Health

Economic conditions may have indirect impacts on health, as a result of the financial resources available to the local population or local government for health-related services.

3.18.1.3 Public Services/Infrastructure and Public Health

Availability of, and changes to public services and infrastructure can have direct or indirect health benefits or consequences. For example, health benefits can occur if new water or sanitation systems reduce disease incidence rates for the local community. There may be negative impacts if new roads or transit corridors increase traffic accidents or negatively impact access to health-related services or activities.

3.18.1.4 Demographics and Public Health

The characteristics of the existing population are directly relevant to assessing potential public health impacts. For this environmental impact statement, local demographics and land use patterns (e.g., residential and recreational) were evaluated, as well as the available health information of Valley County residents. The local population's health status is relevant, as some populations are more sensitive to the effects of hazardous pollutants due to preexisting health conditions. In addition, populations without health insurance and those in poor health due to socioeconomic conditions may be particularly adversely affected, either because their baseline health is poor (sensitive sub-population) or their ability to receive medical care is compromised (Gresenz and Escarce 2011; Hadley 2003; Hadley and Cunningham 2005; Newton et al. 2008). There also is the potential for increased stress or annoyance levels for populations living or recreating nearest to the mining areas due to noise associated with mine operations or vehicle traffic.

3.18.1.5 Summary of Public Health Approach

For this analysis, possible public health impacts with regard to environment, economy, demographics, infrastructure/public services, and community health were considered.

Table 3.18-1 summarizes the resources potentially affected by proposed SGP activities and the possible impacts on public health. The analysis of possible public health and safety impacts is provided in Section 4.18, Public Health and Safety, Environmental Consequences.

3.18.2 Relevant Laws, Regulations, Policies, and Plans

While the National Environmental Policy Act does not directly address effects on public health and safety, it does require that an integrated analysis of health effects be addressed for an environmental impacts analysis. The scope of this analysis is limited to affected communities outside of the mine site and associated facilities and does not include a direct evaluation of the anticipated workforce safety and health issues. All worker health issues are covered under OSHA and MSHA, as described in the following subsections.

3.18.2.1 Occupational Safety and Health Administration

The Occupational Safety and Health Act of 1970 was passed to prevent workers from being killed or seriously harmed at work. This law created OSHA, which sets and enforces protective workplace safety and health standards. OSHA also provides information, training, and assistance to employers and workers. Under OSHA, employers have the responsibility to provide a safe workplace (OSHA 2019).

3.18.2.2 Mine Safety and Health Administration

The U.S. Department of Labor's MSHA works to prevent death, illness, and injury from mining activities and promote safe and healthful workplaces for U.S. miners. MSHA carries out the provisions of the Federal Mine Safety and Health Act of 1977 as amended by the Mine Improvement and New Emergency Response Act of 2006. The agency develops and enforces safety and health rules for all U.S. mines regardless of size, number of employees, commodity mined, or method of extraction. MSHA also provides technical, educational, and other types of assistance to mine operators. MSHA works cooperatively with industry, labor, and other federal and state agencies to improve safety and health conditions for all miners in the United States (MSHA 2019).

3.18.2.3 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for public health and safety and include various objectives, guidelines, and standards for this purpose.”

3.18.2.4 Valley County Comprehensive Plan

As stated in the Valley County Comprehensive Plan (Valley County 2018):

> *"The purpose of the Comprehensive Plan is not to control land, but to prevent uses of land harmful to the community in general."*

The underlying objectives of the plan promote the health, safety, and general welfare of the people of Valley County, and aim to protect citizens from unsafe or unhealthy conditions caused by growth and development in the county.

Table 3.18-1 Summary of Public Health Approach: Potentially Affected Resources and the Possible Impact on Public Health

Category Relevant to Public Health	Potentially Affected Resources	SGP Specifics	Possible Health Impact: Chronic Disease	Possible Health Impact: Infectious Disease	Possible Health Impact: Injury	Possible Health Impact: Nutrition	Possible Health Impact: Well-Being or Psychosocial
Environment	Air	Localized impacts to air quality from fugitive dust and particulate emissions during mining operations; diesel emissions from vehicle traffic and machinery	Negative Effect: Inhalation of particulate emissions	None	None	None	Negative Effect: Inhalation of particulate emissions
Environment	Soil	Aerial deposition impacts to soil from proposed mining emissions	Negative Effect: Direct contact with hazardous pollutants	None	None	None	Negative Effect: Direct contact with hazardous pollutants
Environment	Soil	Uptake of contaminants (i.e., metals) from soil into subsistence foods (plants, berries)	Negative Effect: Ingestion of contaminants from edible plants and berries	None	None	Negative Effect: Ingestion of contaminants from edible plants and berries	Negative Effect: Ingestion of contaminants from edible plants and berries
Environment	Soil	Remediation of residually contaminated soils; removal of legacy tailings piles	Positive Effect: Minimizes direct contact with hazardous pollutants	None	None	None	Positive Effect: Improved environmental quality
Environment	Groundwater	Leaching of contaminants to groundwater from proposed mining operations	None:Groundwater impacts (primarily arsenic and antimony) are greatest immediately downgradient of areas of legacy	None	None	None	Negative Effect: Degraded environmental quality (limited to mine site) Groundwater beneath the site is not used as

Category Relevant to Public Health	Potentially Affected Resources	SGP Specifics	Possible Health Impact: Chronic Disease	Possible Health Impact: Infectious Disease	Possible Health Impact: Injury	Possible Health Impact: Nutrition	Possible Health Impact: Well-Being or Psychosocial
			mining activities, but then decrease further downgradient. Off-site groundwater is unimpacted. Groundwater beneath the site is not used as drinking water.				drinking water and off-site groundwater is unimpacted.
Environment	Groundwater	Remediation of residually contaminated soils resulting in reduced leaching potential of hazardous pollutants to groundwater	None: Groundwater beneath the site is not used as drinking water and off-site groundwater is unimpacted.	None	None	None	Positive Effect: Improved environmental quality
Environment	Surface Water	Reclamation of surface conditions, re-vegetation to reduce run-off of hazardous pollutants to streams and rivers	Positive Effect: Minimizes direct contact with hazardous pollutants	None	None	Positive Effect: Reduction of hazardous pollutants in fish harvested from local water bodies	Positive Effect: Improved environmental quality Negative Effect: Temporary disruption of current recreational areas during operation and reclamation
Environment	Surface Water	Leaching of contaminants from groundwater to surface water	Negative Effect: Direct contact with hazardous pollutants	None	None	Negative Effect: Ingestion of hazardous pollutants in fish harvested from local water bodies	Negative Effect: Direct contact with hazardous pollutants

Category Relevant to Public Health	Potentially Affected Resources	SGP Specifics	Possible Health Impact: Chronic Disease	Possible Health Impact: Infectious Disease	Possible Health Impact: Injury	Possible Health Impact: Nutrition	Possible Health Impact: Well-Being or Psychosocial
Environment	Terrain and Features	Disturbance of existing terrain and features	None	None	Negative Effect: Injury due to natural hazards - avalanche, land slide, flash flooding and water hazards, wildfires	None	Negative Effect: Physical injury
Economy	Personal (income, employment)	Increase in local employment	Positive Effect: Increased access to health care	Positive Effect: Increased access to health care	None	Positive Effect: Increased access to healthy foods	Positive Effect: Positive impacts due to job opportunities
Economy	Revenue or expense to local government (support for or drain on services, infrastructure)	Increased revenue	Positive Effect: Positive impacts due to increased revenue stream	Positive Effect: Positive impacts due to increased revenue stream	None	Positive Effect: Positive impacts due to increased revenue stream	Positive Effect: Positive impacts due to increased revenue stream
Public Services and Infrastructure	Need for new infrastructure	Base camp and employee lodging	None	Negative Effect: Potential transmission of infectious diseases from employees to local community.	Positive Effect: Increased access to health care and emergency services support	None	Positive Effect: Positive impacts due to increased emergency services in remote area
Public Services and Infrastructure	Roads	Construction of improved roads for mining	None	None	Positive Effect: Positive impacts due to improved access to remote area	None	Positive Effect: Positive impacts due to improved access to remote area

Category Relevant to Public Health	Potentially Affected Resources	SGP Specifics	Possible Health Impact: Chronic Disease	Possible Health Impact: Infectious Disease	Possible Health Impact: Injury	Possible Health Impact: Nutrition	Possible Health Impact: Well-Being or Psychosocial
Public Services and Infrastructure	Roads	Increased mine related trucking traffic on roads	Negative Effect: Increased potential for spill of hazardous substances	None	Negative Effect: Increased potential for traffic accidents	None	Negative Effect: Increased potential for traffic accidents
Public Services and Infrastructure	Demand on existing infrastructure and services	Increased power demand to support mining operations	Negative Effect: Increased exposure to electromagnetic fields (EMF) along transmission lines	None	None	None	Negative Effect: Increased exposure to EMF along transmission lines
Demographics	Land use patterns (residential or recreational)	Disturbance of current recreational land use; remediation of residually contaminated soils; removal of legacy tailings piles.	Positive Effect: Minimizes direct contact with hazardous pollutants	None	None	None	Negative Effect: Short term impacts to current recreational activities Positive Effect: Improved environmental quality.
Demographics	Land use patterns (residential or recreational)	Noise disturbances during mine blasting and vehicle noise along truck routes	None	None	None	None	Negative Effect: Psychological effects due to noise

Table Source: AECOM 2020

3.18.3 Existing Conditions

Many natural and human-made public health and safety hazards are present in the analysis area, ranging from avalanches and wildfires to past and present storage and transportation of hazardous materials related to mining operations. Most of the analysis area is open to the public as most of the land is public land managed by the U.S. Forest Service (Forest Service).

Common users of the analysis area include Midas Gold Idaho, Inc (Midas Gold) and Forest Service employees, residents of the village of Yellow Pine, and recreationists. Recreation is a major use throughout much of the analysis area, and activities commonly include hunting, fishing, sightseeing, hiking, camping, all-terrain vehicle use, snowmobiling, and horseback riding. The remote nature of the analysis area presents numerous challenges for emergency operations, which include emergency management services and evacuation procedures.

The following section includes an assessment of the existing: environmental conditions; socioeconomic conditions; public services and infrastructure related to public health and safety; and demographics with respect to land use and baseline community health conditions.

3.18.3.1 Environment and Health

As discussed above, public health impacts associated with the environment could include exposure to pollutant-impacted media (e.g., air, soil, groundwater), as well as potential physical hazards associated with the rugged, mountainous terrain in the analysis area that could result in severe injuries or fatalities. This section discusses the existing conditions of the environmental media and the physical terrain as they relate to public health and safety.

3.18.3.1.1 Air

As described in the Air Quality Baseline Study (Trinity Consultants 2017), potential emissions from the SGP include criteria air pollutants. As discussed in Section 3.3, Air Quality, baseline air quality measurements indicate current concentrations of the criteria air pollutants are well below the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: particulate matter (including particulate matter with an aerodynamic diameter of 10 microns or less and particulate matter with an aerodynamic diameter of 2.5 microns or less), sulfur dioxide, nitrogen dioxide, ozone, lead, and carbon monoxide. The NAAQS are allowable concentration limits adopted by the State of Idaho into the Rules for the Control of Air Pollution in Idaho. Hazardous air pollutants (HAPs) are pollutants that are known or suspected to cause cancer, other serious health effects, or adverse environmental effects. In addition to exposure from breathing HAPs, some HAPs can be transported from the source and deposited onto soils or into surface waters, where they are taken up by plants and/or ingested by animals. Like humans, other animals may experience health problems if exposed to large enough quantities of HAPs over time. Major sources of HAP emissions are required to obtain permits from Title V of the Clean Air Act. There are currently no permitted sources of HAP emissions in the vicinity of the analysis area. Thus, the baseline concentrations of HAPs from human-made sources is likely within regulatory limits (Trinity Consultants 2017).

3.18.3.1.2 SOIL

Reference area samples collected from undisturbed mineralized and non-mineralized zones near the mine site area indicated that concentrations of antimony and arsenic are consistently higher in samples collected from mineralized zones than in samples collected in non-mineralized zones (URS Corporation 2000). Midas Gold evaluated 4,828 exploration soil samples collected from undisturbed areas adjacent to the mine site (Tetra Tech 2019) and reported elevated levels of these metals due to natural mineralization (see Section 3.5, Soils and Reclamation Cover Materials). As described in Section 3.7, Hazardous Materials, past mining activities at the mine site have deposited ore, waste rock, and mine tailings containing metals and other potential pollutants over approximately half of the mine site. Previous studies at the mine site have assessed potential soil contamination resulting from legacy mining activity (URS Corporation 2000). Soils were sampled in areas suspected to contain mining or ore processing contamination. The report showed elevated levels of arsenic, antimony, and mercury in areas disturbed by legacy mining relative to reference concentrations from both non-mineralized and mineralized zones (URS Corporation 2000). Some known contaminated soil was relocated on-site in 2002. Legacy mine tailings also are known to contain elevated levels of arsenic and antimony, and additional soil contaminants may be exposed during mining operations (Section 3.5, Soils and Reclamation Cover Materials). In 2003, the Agency for Toxic Substances and Disease Registry (ATSDR) completed a Public Health Assessment for the Stibnite/Yellow Pine Mining Area (ATSDR 2003). The assessment concluded that reasonable maximum exposure concentrations of arsenic and antimony in surface soil are unlikely to result in adverse public health effects for reclamation workers and recreational users of the site.

Fires have occurred on the landscape in the analysis area, causing extensive erosion and burying of former features in debris. While there has been no confirmation by sampling, it is suspected that there were spills of hazardous materials (such as petroleum hydrocarbons) below legacy tailings, sediment, and waste rock at the mine site related to legacy mining activities. Current baseline conditions in the analysis area include limited use, transportation, and storage of hazardous materials and petroleum substances (e.g., diesel, gasoline, jet fuel, grease, and hydraulic oils) associated with Midas Gold's existing exploration activities. The analysis area could currently be impacted by accidental releases of hazardous materials during transportation to and from the mine site, during storage and use activities, or through improper disposal of waste materials.

3.18.3.1.3 GROUNDWATER

As described in the Stibnite Gold Project Plan of Restoration and Operations (Midas Gold 2016), prior mining operations generated metal-laden tailings, which were deposited in the Meadow Creek valley without consideration to long-term impacts on water quality. These tailings likely represent a source of metals leaching into groundwater and surface water. As discussed in Section 3.9, Surface Water and Groundwater Quality, most contaminants in groundwater samples collected from the alluvial and bedrock wells in the analysis area were detected at concentrations that meet regulatory criteria for most constituents (except arsenic and antimony), as defined by the U.S. Environmental Protection Agency's (EPA's) maximum contaminant levels (MCLs). MCLs are standards that are set by the EPA for drinking water quality. A MCL is the legal threshold limit on the amount of a substance that is allowed in public water systems under the Safe Drinking Water Act. Arsenic and antimony are considered the key chemicals of public health concern in groundwater in the analysis area. The groundwater samples indicated that arsenic and antimony are consistently present at concentrations that exceed MCLs. Highest concentrations were noted in wells directly downgradient of the legacy disturbed areas, with concentrations decreasing further downgradient.

There currently are no active domestic groundwater wells used for drinking water within 15 miles of the mine site. Yellow Pine's public water system uses surface water from Boulder Creek, which is located approximately 15 miles downstream of the SGP area and is a tributary to the East Fork South Fork Salmon River, but drains an area unaffected by prior mining activities. Because groundwater in the SGP area was not used as a drinking water source in the analysis area, and was assumed to not be used as a source in the future, the ATSDR Public Health Assessment eliminated groundwater quality from consideration as a public health concern (ATSDR 2003). However, concentrations of constituents in groundwater in excess of MCLs are assumed to present an adverse effect for drinking water users. Midas Gold currently has a drinking water supply well associated with its exploration camp. The well and associated drinking water treatment system use filtration to remove contaminants of concern to appropriate regulatory levels. Any future use of groundwater in the SGP would likely need to incorporate appropriate filtration systems to remove contaminants of concern due to the naturally elevated levels of arsenic and antimony present.

3.18.3.1.4 SURFACE WATER

Based on the findings of the Surface Water Quality Baseline Study (HDR, Inc. [HDR] 2017a) conducted for the SGP, antimony, arsenic, and mercury are considered the key chemicals of public health interest in surface water in the analysis area and these constituents are naturally elevated in the region (Brown and Caldwell 2017). Arsenic is the most widespread of the key chemicals of concern; in-stream concentrations generally increase along the flow path from Meadow Creek in the south to the East Fork South Fork Salmon River downstream to the confluence of Sugar Creek in the north (Brown and Caldwell 2017). Antimony concentrations in surface water show a slightly different distribution compared to arsenic, with elevated concentrations typically beginning in the East Fork South Fork Salmon River below Meadow Creek. Antimony also shows more seasonal variability than arsenic. Total and dissolved antimony and arsenic concentrations tend to be lowest during the high flow conditions associated with spring snowmelt. These findings suggest that groundwater inflows are the main source contributing to surface water antimony and arsenic concentrations at the mine site. Mercury concentrations in surface water show a different distribution compared to either arsenic or antimony, with the highest mercury concentrations occurring in samples collected from Sugar Creek both upgradient and downgradient of the confluence of West End Creek and Sugar Creek. Total and dissolved mercury tend to reach a peak during high flow conditions, indicating soil and stream channel erosion as potential mercury sources. This is consistent with the U.S. Geological Survey's (USGS) findings, which demonstrated that 98 percent of the estimated total mercury load transported downstream of the analysis area is attributable to Sugar Creek, as a result of natural sources and anthropogenic disturbances (mine waste rock piles and mine tailings) near the Cinnabar Mine on Cinnabar Creek (Brown and Caldwell 2017). The Cinnabar Mine is located outside of the SGP area.

The ATSDR Public Health Assessment (ATSDR 2003) evaluated potential public health risk associated with exposure to contaminants in surface water from the mine site. The Public Health Assessment was based on surface water data collected in 1997 and 1999 from various streams and creeks in the mine site area, as well as from seeps and surface water in the Yellow Pine pit lake. Maximum concentrations of arsenic and antimony in surface water data used in the ATSDR Public Health Assessment ranged from 12 to 535 micrograms per liter and 8.3 to 281 micrograms per liter, respectively, which is within the range of concentrations measured in seeps and surface water samples evaluated in the Surface Water Quality Baseline Study (HDR 2017a).

The ATSDR Public Health Assessment concluded that contaminants in surface water would be unlikely to result in adverse health effects for recreational users in the existing mine site (ATSDR 2003). In addition, the ATSDR Public Health Assessment concluded that for recreational fishers and even for local fishers from American Indian tribes, who have higher fish consumption rates, consumption of fish harvested from surface waters in the mine site is unlikely to result in any adverse health effects (ATSDR 2003).

3.18.3.1.5 Existing Terrain And Features

As described in the Public Health and Safety Baseline Study (HDR 2017b), the rugged, mountainous terrain in the analysis area includes many potential hazards to public health and safety that could result in severe injuries or fatalities to users. Common hazards related to terrain include extremely steep slopes, rock cliffs, uneven terrain, and fallen trees. Avalanches, rock falls and debris flows also present a potential hazard for travelers, recreationists, and Forest Service and Midas Gold employees. They can cause severe injury or death and can block access to homes, cabins, and recreation sites. As described in the Recreation Baseline Study (HDR 2017c), the analysis area is a popular destination for winter recreation activities, including snowmobiling, snowshoeing, and cross-country skiing. Recreationists participating in these activities are at risk for causing or encountering avalanches in the analysis area.

Also described in the Public Health and Safety Baseline Study (HDR 2017b), the entire analysis area presents potential flash flood and debris-flow hazards that also can cause severe injury or death, and can block access to homes, cabins, and recreation sites. In addition, areas that were not traditionally flood-prone are at risk due to changes to the landscape caused by wildfires.

Similar to flash-flooding and debris flows, portions of the analysis area are susceptible to landslides and avalanches due to factors such as geology, landscape, climate, and soil, as was experienced in 2014, 2017 and 2019 along the South Fork of the Salmon River Road (National Forest System Road 474/50674) and the Stibnite portion of the McCall-Stibnite Road (County Road [CR] 50-412).

Wildfires are another potential hazard in the analysis area that can cause severe injury or death for travelers, recreationists, and Forest Service and Midas Gold employees, as well as damage to homes and property. They can spread unpredictably and rapidly and are highly dependent on changing weather patterns. Past wildfires have presented health and safety risks to the public. Much of the analysis area was burned by major wildfires in 2000, 2006, and 2007, as detailed in the Vegetation Baseline Study (HDR 2017d), as well as more recently in 2019. The danger of wildfires in the analysis area remains. The dense stands of snags and dead material left behind on the forest floor by those fires could be sources of fuel for future fires.

3.18.3.2 Economics and Health

Section 3.21, Social and Economic Conditions, discusses the existing social and economic conditions of the analysis area in detail. In 2018, Valley County had a relatively strong economy with an unemployment rate of 2.2 percent, slightly less than the 2.9 percent Idaho statewide unemployment rate. In 2018, 10.0 percent of Valley County residents were below the poverty level, which was less than the Idaho statewide percentage of 13.8. Median household and per capita incomes in Valley County were slightly higher than the statewide averages. The percentage of people not in the labor force in Valley County (50.5 percent) also was higher than the statewide average (37.6 percent) (**Table 3.21-4**, Valley County, Adams County, and Idaho Income [2018 Dollars]).

The Idaho Department of Labor collects data on employment by industry in each county. Valley County was substantially affected by the 2008 recession, but in recent years its economy has subsequently recovered. Historically, Valley County's economy was dependent on timber extraction; however, the county's last mill closed in 2001 and the loss of 70 jobs has continued to impact the area (Idaho Department of Environmental Quality 2019). In 2018, the tourism (leisure and hospitality) and trade, utilities, and transportation industries employed a majority of Valley County workers. Currently, the highest paying jobs in Valley County are in the mining, information services, government, and education/health service sectors (**Table 3.21-5**, Employment and Wages by Industry in Valley and Adams County [2018 Dollars]).

3.18.3.3 Public Services/Infrastructure and Health

The existing analysis area is remote and limited services exist; most of the remaining mining infrastructure is abandoned. Significant improvements to off-site and on-site infrastructure would be necessary to support the proposed cleanup of legacy impacts and site reclamation, exploration, mining and ore processing, and closure. The following subsections summarize the existing infrastructure conditions and services most relevant to the public health and safety analysis.

3.18.3.3.1 Historic Mine Features

As described in the Public Health and Safety Baseline Study (HDR 2017b), significant portions of the analysis area have a long history of mining activities that left behind a range of potential hazards. Some facilities and buildings associated with previous mining operations have been dismantled or destroyed by fire, but the mine site still contains dilapidated structures, old mining equipment, underground mine openings (all collapsed and/or closed) and altered landscapes, such as mine pits, abandoned and reclaimed townsites, abandoned and reclaimed mine and exploration roads, hydroelectric generating foundations, municipal dumps at various locations, the reclaimed Hecla heap leach pad, the spent ore disposal area, and waste rock disposal areas. Because most of these hazards are on private land, unauthorized entry is considered trespassing, but these areas are easily accessible to the public.

Efforts have been made by Midas Gold to mitigate potential public safety issues related to these features. For example, “danger” and “no-trespassing” signs are posted near pits and waste rock disposal facilities where terrain is steep and benches could be unstable. Efforts also have been made to render old adits inaccessible by collapsing the entrances and posting warning signs. However, numerous hazards still exist throughout the mine site, including discarded sharp, rusted metal objects, foundation remnants, nails, glass, and other debris (HDR 2017b).

3.18.3.3.2 ROADS

Vehicle travel on National Forest System roads and CRs in the analysis area presents health and safety risks ranging from hazardous road conditions to transportation of hazardous materials through the analysis area. Many National Forest System roads, including those in the analysis area, are open to the public and used by federal, county, state, Midas Gold, and private vehicles. The analysis area is dominated by unpaved roads, one state highway, and county roads (**Figure 3.16-1**). The road segment of highest safety and traffic concern from the access and transportation risk analysis was found to be the Warm Lake Road (CR 10-579), with an average of 8 vehicle accidents per year from 2000 to 2016 (see Section 3.16, Access and Transportation).

Section 3.16, Access and Transportation, presents a detailed characterization of existing transportation routes, road conditions, design standards, and recorded vehicle accidents that have occurred in the analysis area. The analysis area experiences harsh weather conditions that pose potential travel hazards, especially during winter, when roads become snow-covered or icy. During winter, Valley County maintains only one route from Cascade to the analysis area, which follows Warm Lake Road (CR 10-579) to the intersection with South Fork Salmon River Road (National Forest System Road 474), then to the East Fork Stibnite Road portion of the McCall-Stibnite Road (CR 50-412) to the village of Yellow Pine. Midas Gold maintains Stibnite Road (CR 50-412) for access from the village of Yellow Pine to the mine site. All other routes to the mine site are not maintained (plowed or sanded) when snow-covered roads become impassable to vehicles.

3.18.3.3.3 POWER AND UTILITIES

From the Lake Fork substation, there is an existing 42-mile-long 69-kilovolt (kV) electric transmission line that passes through Cascade and connects with a substation near Warm Lake. Electricity for Yellow Pine is currently provided by an existing 21.5-mile-long 12.5-kV electric distribution line that connects to the Warm Lake substation. Idaho Power Company’s existing transmission line runs from its Lake Fork Substation south of McCall along its existing right-of-way to the Johnson Creek Airstrip. No power is currently supplied via a transmission line to the mine site. Potential public health and safety hazards associated with transmission lines are from exposure to EMF and shock hazards. Magnetic and electric fields are separate phenomena that occur both naturally and as a result of human activity. Human-induced fields occur over a broad electrical and electromagnetic spectrum and are generated by communications equipment, appliances, and the generation, transmission, and local distribution of electricity.

Both electric and magnetic fields are produced when transmission lines are energized. Both electric and magnetic fields decrease rapidly with distance from the source. In addition, electrical fields associated with transmission lines are dampened by most objects, such as trees or houses, which shield receptors; however, magnetic fields are not easily shielded by objects or materials. As a result, the primary concern regarding potential health effects associated with EMF from transmission lines is related to magnetic fields (National Institute of Environment Health Services [NIEHS] 2002).

Most people in the United States are exposed to magnetic fields that average less than 2 milligauss (NIEHS 2002). Magnetic fields directly beneath power distribution lines typically range from 10 to 20 milligauss. Transmission lines and electrical appliances are the most common sources of non-ionizing EMFs and are considered extremely low frequency (ELF) forms of radiation. ELF-EMFs omit non-ionizing radiation from 1 to 3,000 hertz. ELF fields at 60 hertz are produced by transmission lines, electrical wiring, and electrical equipment in North America (NIEHS 2002).

During the 1990s, most EMF research focused on ELF exposures stemming from conventional power sources, such as transmission lines, electrical substations, or home appliances. While some of these studies showed a possible link between EMF field strength and an increased risk for childhood leukemia, their findings indicated that such an association was weak (International Agency for Research on Cancer 2002; NIEHS 1999; WHO 2007). Research over the decades by both national and international panels has been inconclusive regarding potential public health risks from exposure to EMF, and existing data do not provide sufficient evidence to conclude that EMF causes cancer. No EPA or State of Idaho limits for EMF exposure have been issued.

Although there are no federal standards limiting EMF from transmission lines and other sources to people at work or home, some states set standards for the width of rights-of-way under high-voltage transmission lines due to the potential for electric shock (EPA 2018; Idaho Power Company 2013).

Transmission lines transmit high-voltage electricity from the generation source or substation to another substation in the electric distribution system (OSHA 2020). Transmission lines move electricity more efficiently than lower voltage distribution lines, which deliver power directly to customers. Transmission lines vary in voltage from 69 kV up to 765 kV (OSHA 2020). A person standing directly under a high-voltage transmission line may feel a mild shock when touching something that conducts electricity. These sensations are caused by the strong electric fields from the high-voltage electricity in the lines. They occur only at close range because the electric fields rapidly become weaker as the distance from the line increases. Electric fields may be shielded and further weakened by buildings, trees, and other objects that conduct electricity (NIEHS 2002).

The magnetic fields generated by transmission lines also can induce currents and voltages in conductive objects such as metal fences, automobiles, and metal roofs or buildings that are close to and run parallel to the transmission line. The induced currents in these objects can result in a small electrical shock or a perceptible current when contacted by humans or animals. These small shocks are a nuisance, but do not cause physiological harm (NIEHS 2002).

Direct contact with exposed or downed transmission lines could result in significant electrical shock. However, the incidence of downed transmission lines would be unlikely, occurring only in the rare event of an accident, severe weather, or natural disaster.

3.18.3.3.4 SANITARY AND SOLID WASTE

Midas Gold currently has and uses sanitary waste handling facilities at the exploration housing facility and other facilities that were approved by Valley County, Idaho Department of Environmental Quality, and Idaho Department of Health and Human Services (i.e., packaged sewage treatment facilities and leach fields and a recycling program that minimizes waste and trash delivery to area landfills) (Midas Gold 2016).

3.18.3.3.5 EMERGENCY MEDICAL SERVICES AND FIRE PROTECTION

In the event of a disaster or emergency, the local government’s primary responsibility is to respond to the incident to preserve life and property. As described in the Public Health and Safety Baseline Report (HDR 2017b), due to the remote nature of the proposed SGP, most of the analysis area is located more than 30 miles from the nearest local emergency services. The mine site is 68 miles from Cascade and 50 miles from McCall, the two closest communities with hospitals. The nearest hospital with specialized care facilities is in Boise 146 miles away. The emergency transportation service stations for Life Flights are in Boise, Idaho and Ontario, Oregon and service up to a 175-mile radius area. Recently, a new helipad was added in Yellow Pine for emergency transport via Life Flight (Yellow Pines Times 2019). No urgent care or medical facilities are located close to the mine site or Yellow Pine; however, there is a Cascade Fire/EMS Paramedic Ambulance Substation in Yellow Pine, which allows the community to administer First Aid and Advanced Life Support (Yellow Pines Times 2018). In addition to the Village of Yellow Pine Fire District, there are three major fire-fighting agencies and districts in Valley County that serve the communities of Cascade, Donnelly, and McCall, as well as the rural areas surrounding these towns. These fire districts provide 24-hour fire protection for businesses and residents and are mostly staffed by volunteers. In the event of a catastrophic emergency, all the fire-fighting districts, the American Red Cross Valley County Chapter, and Valley County personnel would join forces to compose the Valley County Fire Working Group Collaborative. For larger scale emergencies, local officials may implement emergency statutes and ordinances and declare a local state of emergency to mobilize and commit their resources. If local governments do not have sufficient resources to handle an emergency, they can request the support of the Idaho Emergency Operations Center, which developed the Idaho Emergency

Operations Plan, a statewide comprehensive plan outlining disaster emergency response (Idaho Emergency Operations Center 2017).

3.18.3.4 Demographics and Health

Section 3.21, Social and Economic Conditions, discusses the existing demographics of the analysis area in detail. The SGP is located in Valley County, which encompasses approximately 3,664 square miles and is comprised of over 88 percent public lands. Cascade is the county seat, and McCall is the largest population center. Valley County is the fifth largest county in Idaho by area but is only the 28th most populated (year-round residence) county of the 44 counties. As of 2018, Valley County had an estimated year-round population of 10,401 people (U.S. Census Bureau 2018); however, the county does experience a seasonal increase of residents during the summer months. Non-Hispanic whites make up most of the population of Valley County (98.9 percent), with only 1.8 percent and 0.2 percent being Hispanic and American Indian, respectively, below the state averages of 12.7 percent and 1.3 percent, respectively. Yellow Pine is the closest residential community to the analysis area. According to the 2010 Census, Yellow Pine has a small population of only 32 people and comprises a small area of approximately 1 square mile.

3.18.3.4.1 LAND USE

Section 3.15, Land Use and Land Management, discusses the existing land use of the analysis area in detail. The Stibnite area has been the site of widespread mining and mining-related activities for over a century, the effects of which dominate the mine site. Most of the proposed SGP is in a relatively unpopulated, remote area. The closest (non-Midas Gold) occupied residence is in Yellow Pine, approximately 14 road miles west of the mine site. Most of the area adjacent to the mine site is open to the public because most of the land is public land managed by the Forest Service. Common users of the mine site include Midas Gold and Forest Service employees, residents of Yellow Pine, and recreationists. Recreation is a major use throughout much of the analysis area; activities commonly include hunting, fishing, sightseeing, hiking, camping, all-terrain vehicle use, snowmobiling, and horseback riding.

3.18.3.4.2 NOISE

Section 3.6, Noise, discusses existing noise conditions of the analysis area in detail. Noise is defined as “unwanted sound.” To avoid hearing impairment, impulse noise exposures should not exceed a peak sound pressure of 140 decibels (dB) in adults and 120 dB in children (WHO 1999). According to the Centers for Disease Control and Prevention, noise above 85 dB over a prolonged period may begin to cause hearing damage, and loud noise above 120 dB can cause immediate harm to ears. There are some non-auditory impacts on human health due to noise at sound levels beyond those associated with ear impairment (WHO 1999); this is an ongoing area of research. Non-auditory effects due to noise in a community can contribute to stressors that may influence health such as:

- Reductions in quality of life (potentially work, home, and school life), as noise can disrupt speech and sleep, potentially leading to increases in stress and reduction in productivity (U.S. Department of Transportation 2005).
- Effects on cardiovascular health via increases in blood pressure (Babisch 2011).
- Changes in hormone levels related to a stress response (Evans et al. 2001).

In addition, noise can represent a nuisance with associated annoyance levels for those affected. There is not a clear delineation as to when an "annoyance" results in a stress significant enough to produce measurable health effects; thus, some community noise analyses are based on annoyance perception levels rather than health effects (U.S. Department of Transportation 2005). Providing further complication, the impacts of increased sound depend not only on the numerical increase in sound levels, but also on the intensity and duration of the sound, as well as the sound setting (WHO 1999). Unexpected, short duration, high intensity sounds can have a worse effect than relatively steady sounds. Humans do appear to have an adaptive response to typical sound levels in their environment; once adaptation has occurred; sleep patterns are generally not affected (Stansfeld and Matheson 2003).

As discussed in Section 3.6, Noise, baseline sound levels at the 12 baseline noise measurement locations in the analysis area ranged from 34 decibels on the A-weighted scale (dBA) to 64 dBA. For comparison, 40 dBA is relatively quiet and can be equated to the noise level of a residence at night, while 60 dBA is comparable to a normal conversation and is considered a comfortable noise level.

3.18.3.4.3 Community Health

As summarized in **Table 3.18-2**, Valley County ranks sixth best in the state for health outcomes, based on an equal weighting of length and quality of life. Valley County ranks fourth best in the state for overall health factors, based on weighted scores for health behaviors, clinical care, social and economic factors, and the physical environment.

Table 3.18-2 Valley County Health Ranking in the State of Idaho

Valley County Measure of Health	2019 County Report Rank (out of 44)
Health Outcomes (overall)	**6**
Length of Life	14
Quality of Life	1
Health Factors (overall)	**4**
Health Behaviors (tobacco, diet and exercise, alcohol use, high risk sexual behavior)	3
Clinical Care (Uninsured adults, primary care providers rate, preventable hospital stays, diabetic screenings)	2
Social and Economic Factors (education, employment, income, family and social support, community safety)	12
Physical Environment (air quality, built environment)	30

Table Source: County Health Rankings and Roadmap 2019

Table 3.18-3 summarizes the health outcomes and health factors for Valley County compared to the State of Idaho as a whole and the U.S. median. As shown in **Table 3.18-3**, Valley County has better health outcomes than the state overall, as well as the U.S. median, in most categories measured.

Table 3.18-3 Detailed Health Outcomes and Measures for Valley County Compared to National and State Results

Factor	Measure	Description	US Median	Idaho State Overall	Valley County, Idaho
Health Outcome	Premature death	Years of potential life lost before age 75 per 100,000 population	8,100	6,251	6,217
Health Outcome	Poor or fair health	Percent (%) of adults reporting fair or poor health	17%	15%	13%
Health Outcome	Poor physical health days	Average number (#) of physically unhealthy days reported in past 30 days	3.9	3.7	3.4
Health Outcome	Poor mental health days	Average # of mentally unhealthy days reported in past 30 days	3.9	3.7	3.6
Health Outcome	Low birthweight	% of live births with low birthweight (< 2500 grams)	8%	7%	6%
Health Behavior	Adult smoking	% of adults who are current smokers	17%	14%	13%
Health Behavior	Adult obesity	% of adults that report a body mass index (BMI) ≥ 30	32%	28%	25%
Health Behavior	Food environment index	Index of factors that contribute to a healthy food environment, (0-10)	7.7	7.2	7.5
Health Behavior	Physical inactivity	% of adults aged 20 and over reporting no leisure-time physical activity	26%	19%	17%
Health Behavior	Access to exercise opportunities	% of population with adequate access to locations for physical activity	66%	78%	86%
Health Behavior	Excessive drinking	% of adults reporting binge or heavy drinking	17%	17%	17%
Health Behavior	Alcohol-impaired driving deaths	% of driving deaths with alcohol involvement	28%	31%	26%
Health Behavior	Sexually transmitted infections	# of newly diagnosed chlamydia cases per 100,000 population	321.7	356.3	198
Health Behavior	Teen births	# of births per 1,000 female population ages 15-19	31	24	13
Clinical Care	Uninsured	% of population under age 65 without health insurance	10%	12%	13%

Factor	Measure	Description	US Median	Idaho State Overall	Valley County, Idaho
Clinical Care	Primary care physicians	Ratio of population to primary care physicians	2,050:1	1,547:1	617:1
Clinical Care	Dentists	Ratio of population to dentists	2,450:1	1,547:1	1527:1
Clinical Care	Mental health providers	Ratio of population to mental health providers	970:1	506:1	534:1
Clinical Care	Preventable hospital stays	Rate of hospital stays for ambulatory-care sensitive conditions per 100,000 Medicare enrollees	4648	2696	1597
Clinical Care	Mammography screening	% of female Medicare enrollees ages 67-69 that receive mammography screening	40%	39%	40%
Social and Economic Factor	High school graduation	% of ninth-grade cohort that graduates in four years	90%	80%	83%
Social and Economic Factor	Some college	% of adults ages 25-44 with some post-secondary education	58%	65%	75%
Social and Economic Factor	Unemployment	% of population aged 16 and older unemployed but seeking work	4.4%	43.2%	4.4%
Social and Economic Factor	Children in poverty	% of children under age 18 in poverty	21%	15%	14%
Social and Economic Factor	Income inequality	Ratio of household income at the 80th percentile to income at the 20th percentile	4.4	4.3	3.6
Social and Economic Factor	Children in single-parent households	% of children that live in a household headed by a single parent	32%	25%	27%
Social and Economic Factor	Social associations	# of membership associations per 10,000 population	12.6	7.4	18.1
Social and Economic Factor	Violent crime	# of reported violent crime offenses per 100,000 population	205	221	327
Social and Economic Factor	Injury deaths including planned (homicide, suicide) and unplanned (motor vehicle accidents, falls, poisoning)	# of deaths due to injury per 100,000 population	82	73	75
Physical Environment	Air pollution – particulate matter	Average daily density of fine particulate matter in micrograms per cubic meter (particulate matter with an aerodynamic diameter of 2.5 microns or less)	9.2	7.4	6.6
Physical	Severe housing	% of households with	14%	16%	20%

Factor	Measure	Description	US Median	Idaho State Overall	Valley County, Idaho
Environment	problems	overcrowding, high housing costs, or lack of kitchen or plumbing facilities			
Physical Environment	Driving alone to work	% of workforce that drives alone to work	81%	79%	79%
Physical Environment	Long commute – driving alone	Among workers who commute in their car alone, % commuting > 30 minutes	30%	23%	10%

Table Source: County Health Rankings and Roadmap 2019

3.19 RECREATION

3.19.1 Scope of Analysis

This section describes recreation resources, including recreation opportunities, physical facilities, access for recreation, and the setting in which recreation activities occur within the analysis area. This section also describes existing recreation uses/users and recreation-related special use permits. As shown in **Figure 3.19-1**, the analysis area for recreation includes Payette National Forest (PNF) Management Area (MA) 13 (Big Creek/Stibnite) and Boise National Forest (BNF) Management Areas BNF MA 21 (Lower Johnson Creek), BNF MA 20 (Upper Johnson Creek), BNF MA 19 (Warm Lake), and a portion of BNF MA 17 (North Fork Payette River) because these are the management areas where Stibnite Gold Project (SGP) components are located and where recreation surrounding these components generally occurs and thus may be affected by the SGP. The analysis area for recreation also includes a 5-mile radius from the major SGP components to account for where the SGP could be visible within foreground or middle ground distances (see Section 3.20) and noise from SGP activities could be audible (see Section 3.6), thus potentially affect recreation opportunities and settings. The 5-mile radius generally falls within the management areas listed above; however, it does extend outside the management area boundaries in some locations, particularly into adjacent wilderness where recreation could be affected.

3.19.2 Relevant Laws, Regulations, Policies, and Plans

3.19.2.1 National Forest Management Act

The National Forest Management Act of 1976 (16 United States Code 1600) directs the U.S. Forest Service (Forest Service) through the forest planning process to provide for a variety of multiple uses, including recreation. To implement the terms of the National Forest Management Act, the Forest Service developed the Recreation Opportunity Spectrum (ROS) to ensure “a broad spectrum of dispersed and developed recreation opportunities,” which is described in further detail in Section 3.19.3.4, Recreation Setting, (Forest Service 1982).

3.19.2.2 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for recreation and include various objectives, guidelines, and standards for this purpose.

3.19.2.3 John D. Dingell, Jr. Conservation, Management, and Recreation Act

According to Section 4102 of the John D. Dingell, Jr. Conservation, Management, and Recreation Act ("Dingell Act") of 2019 (Public Law 116-9), "Federal land shall be open to hunting, fishing and recreational shooting, in accordance with applicable law, unless the Secretary concerned closes an area in accordance with Section 4103." Under Section 4103, "[T]he Secretary concerned may designate any area on Federal land in which, and establish any period during which, for reasons of public safety, administration or compliance with applicable laws, no hunting, fishing or recreational shooting shall be permitted." Prior to closing federal land to hunting, fishing, or recreational shooting, there must be consultation with state fish and wildlife agencies, and a public notice must be provided, as well as an opportunity for public comment subject to the requirements in paragraph (2) of Section 4103(b), Public Law 116-9. However, this does not apply if the closure is covered under a special use permit.

3.19.2.4 State of Idaho Local Land Use Planning Act (1972)

As stated in Section 67-6502, the purpose of the State of Idaho Local Land Use Planning Act (1972) is, in part "to promote the health, safety, and general welfare of the people of the state of Idaho as follows: …10) to protect fish, wildlife, and recreation resources."

3.19.2.5 Idaho Outfitters and Guides Act

The Idaho Outfitters and Guides Act (Title 36, Chapter 21, Idaho Code) requires a license as a prerequisite for conducting outfitting and guiding. Under the Act, the Idaho Outfitters and Guides Licensing Board (IOGLB) is responsible for determining the qualifications for outfitters and guides and issuing state licenses to commercial outfitters and guides in the State of Idaho.

3.19.2.6 Valley County Comprehensive Plan

The purpose of the Valley County Comprehensive Plan is to promote the health, safety, and general welfare of the people of the state of Idaho, and in part, to ensure the protection of "fish, wildlife, and recreation resources" (Valley County 2018). The Valley County Comprehensive Plan also includes a Recreation and Open Space goal "To promote and support a viable recreation and tourism program …" (Valley County 2018). Objectives include creating improvements for more varied recreation opportunities, promoting development of new recreation facilities when compatible with land use goals, and protecting access to public lands (Valley County 2018).

3.19.2.7 City of Cascade Comprehensive Plan

The City of Cascade Comprehensive Plan (City of Cascade 2018) recognizes recreation and open space as management elements that set forth the community's goals and objectives for expanded and enhanced recreational opportunities. One of the city's goals is to "Expand recreation and open space varieties and opportunities." The City of Cascade Comprehensive Plan recognizes the proximity of BNF recreational opportunities to residents and acknowledges that these recreational use areas are a major tourism driver.

3.19.3 Existing Conditions

The analysis area is a popular area for a variety of recreation activities on both private and public lands. The only community located east of Highway 55 in the analysis area is the village of Yellow Pine. Services are limited in Yellow Pine, which had a year-round population of 32 in 2018 (U.S. Census Bureau 2018). There also is an unincorporated community in the Big Creek/Edwardsburg area, which has residents during the summer (Forest Service 2003a). **Figure 3.19-1** shows the recreation analysis area; additional maps of the analysis area depicting recreation facilities and recreation setting conditions can be found in **Appendix N-1,** Chapter 3 Recreation Mapbooks and Figures. The analysis area includes the affected PNF and BNF management areas, as well as a 5-mile radius from SGP components to account for where the SGP could be visible within foreground or middle ground distances (see Section 3.20) and noise from SGP activities could be audible (see Section 3.6). The 5-mile radius generally falls within the affected management areas; however, it does extend outside the management area boundaries in some locations, particularly into adjacent wilderness where recreation could be affected. The following sections describe the existing recreation opportunities, facilities, access, setting, use and users, and special use permits in the analysis area.

3.19.3.1 Recreation Opportunities

The analysis area includes over 170 miles of trails open to motorized use. Over 60 percent of the trails in the analysis area that are open to motorized use are open to motorcycles, and over 35 percent are open to vehicles 50 inches or less in width. Motorized recreation opportunities are available throughout the analysis area, including on trails in inventoried roadless areas, which are predominantly in PNF MA13 and BNF MAs 19, 20, and 21.

In the winter, snowmobiling is popular on 96 miles of groomed over-snow vehicle (OSV) routes that branch off the plowed main routes through the analysis area. The Idaho Department of Parks and Recreation grooms many miles of OSV trails in the analysis area. Cross-country skiing opportunities are available in BNF MA 17 (Forest Service 2010).

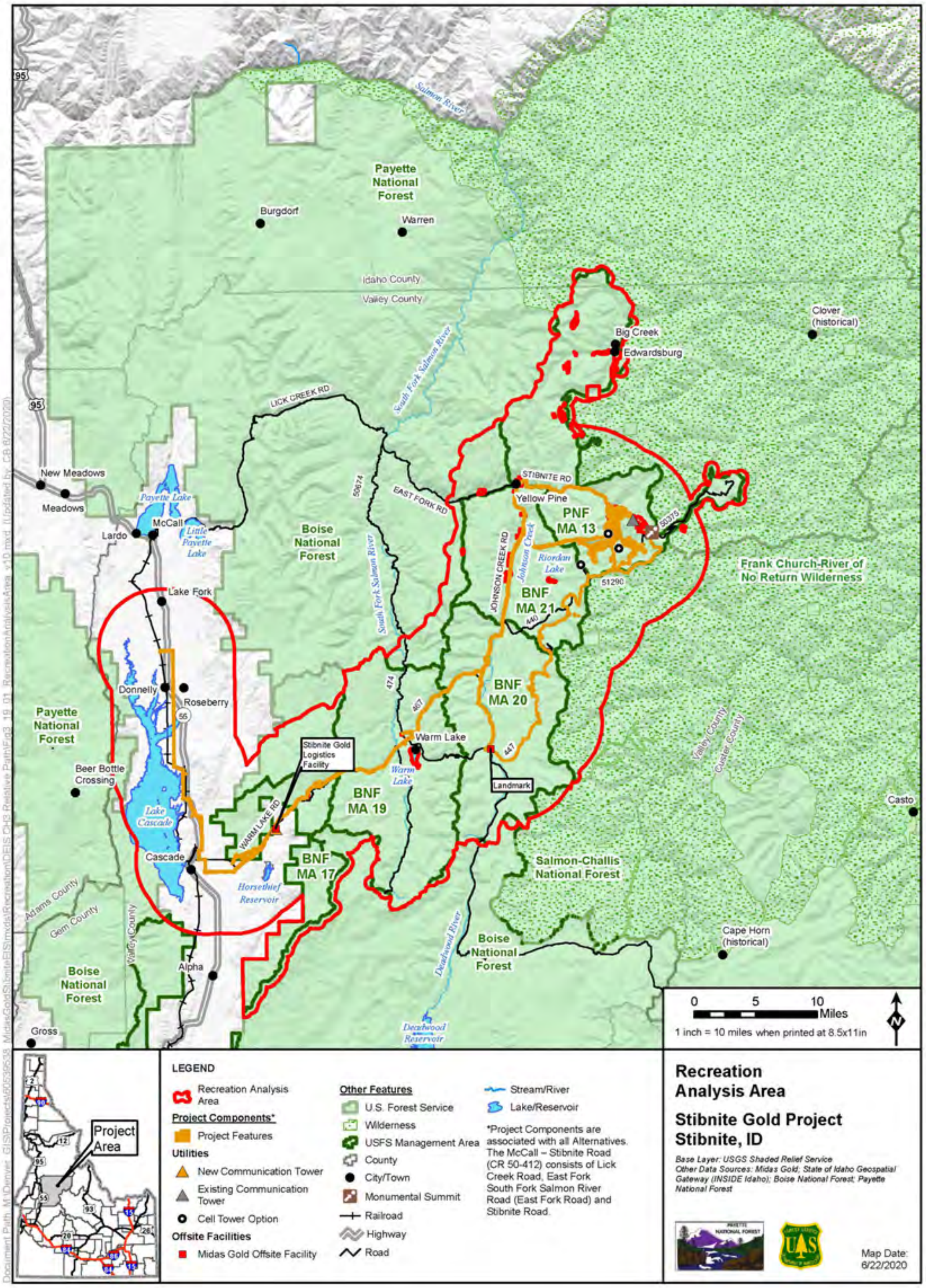

Figure Source: AECOM 2020

Figure 3.19-1 Recreation Analysis Area

Summertime recreation opportunities such as hunting, fishing, hiking, camping, and horseback riding also are popular throughout the analysis area with opportunities available at developed facilities, such as campgrounds and trails, and at dispersed locations, such as dispersed camping areas and specially designated areas including Inventoried Roadless Areas, Frank Church-River of No Return Wilderness (FCRNRW), and suitable Wild and Scenic Rivers. Warm Lake is a destination for water-related recreation, such as boating and swimming. Backpacking and pack trips are popular in the Big Creek area and from trailheads into the FCRNRW. Fishing opportunities are available throughout the analysis area, particularly at Johnson Creek, Warm Lake, South Fork Salmon River, and East Fork South Fork Salmon River, for species such as salmon, steelhead, whitefish, and trout.

3.19.3.2 Recreation Facilities

The Warm Lake area contains most of the developed recreation facilities (apart from trailheads) in the analysis area. Forest Service campgrounds and other private recreation facilities also are located in the Big Creek and Landmark areas and along Johnson Creek Road (County Road [CR] 10-413) around and south of Yellow Pine. Privately-owned recreation facilities also are located at Warm Lake and include lodges, organizational camps, and recreation residence tracts (privately owned homes located on National Forest System [NFS] lands). There also is a lodge in the Big Creek area and one along Johnson Creek Road (CR 10-413) (Wapiti Meadow Ranch). Forest Service trailheads and trails are throughout the analysis area, several of which provide access to the FCRNRW. Trails are described further below.

Recreation facilities on NFS lands in the analysis area include 16 campgrounds, 2 dispersed camping areas, 28 trailheads, 2 interpretive sites, 4 lookouts/cabins, 1 boating site, 1 swimming site, and 2 wildlife viewing sites. These recreation facilities are shown on maps in **Appendix N-1**. Information regarding the season of use (e.g., summer/winter), type of use (e.g., motorized/non-motorized), and primary and secondary access roads to each of these facilities is included in **Table N-1** in **Appendix N-1**.

The analysis area contains approximately 340 miles of developed trails, about 51 percent of which are open to motorized recreation use. The majority of the 174 miles of trails open to motorized vehicles in the analysis area are open to motorcycles (32 trails for a total of 113.8 miles), or vehicles 50 inches or less in width (19 trails for a total of 57.6 miles). Only one trail, Horse Heaven Meadow (l Forest Trail [FT] 233) is open to all vehicles (3 miles). One motorcycle trail (FT-091 Trout-Thunderbolt) is only open in the summer season (June 1 to September 15); the rest of the trails are open year-round. **Table N-2** in **Appendix N-1** provides a list of the trails open to motorized vehicles, the trail length in the analysis area, and the type of vehicles allowed on each trail. The trails listed in **Table N-2** are displayed on the maps in **Appendix N-1**; however, due to scale, not all the trails may have labels.

About 49 percent of developed trails (165 miles) are open only for non-motorized trail use (biking, hiking, and/or horseback riding). Several of these trails are located adjacent to or in the FCRNRW. Trailheads located in PNF MA 13 and BNF MAs 20 and 21 provide access to trails in the FCRNRW. Trails in the FCRNRW are open to non-mechanized uses (e.g., hiking, backpacking, horseback riding). Forty of the 53 non-motorized trails in the analysis area are open to biking, hiking, and horseback riding; 12 are open to just one or two of these three uses (**Table N-3** in **Appendix N-1**). One trail, Artillery Dome Road, is open to non-motorized use in the winter for cross country skiing and snowshoeing use. **Table N-3** in **Appendix N-1** provides a list of all non-motorized trails in the analysis area. These trails are displayed on the maps in **Appendix N-1**; however, due to scale, not all of the trails may have labels.

Lake Cascade is located west of the existing Idaho Power Company transmission line corridor north and west of the BNF MA 17. Lake Cascade State Park includes 3-day use areas, two group day use areas, 12 campgrounds, and six boat ramps (Idaho Parks and Recreation No Date). The park is open year-round and provides opportunities for camping, picnicking, hiking, mountain biking, swimming, cycling, boating, sailing, windsurfing, fishing, snowshoeing, Nordic skiing, and ice fishing (Idaho Parks and Recreation 2019). The park is accessed from a variety of roads located off State Highway 55 between Cascade and Donnelly (Idaho Parks and Recreation No Date).

3.19.3.3 Recreation Access

Access to the analysis area is primarily via paved roads that lead to unpaved county and NFS roads. The main access roads (from west to east) include State Highway 55 and Warm Lake Road (CR 10-579) to Landmark. From Landmark, the main access roads are county-maintained gravel roads that travel north to Yellow Pine and up to Big Creek. These roads include Johnson Creek Road (CR 10-413) and Warren-Profile Gap Road (National Forest System Road [FR] 50340). Yellow Pine also can be reached from McCall via the county-maintained McCall-Stibnite Road.

From these main roads, connecting unpaved NFS roads provide access to NFS lands and facilities. Primary Forest Service access roads (from west to east) in the analysis area include Clear Creek Road (FR 409), South Fork Salmon River Road (FR 50674/474), Rice Creek Road (FR 478), Antimony Road (FR 416), Burnt Log Road (FR 447), Old Thunder Mountain Road (FR 440), Meadow Creek Lookout Road (FR 51290), and Thunder Mountain Road (FR 50375). In total, there are approximately 460 miles of NFS roads in the analysis area open to all motorized vehicles year-round, as shown in **Table N-4** in **Appendix N-1**, and approximately 23 miles of NFS roads open to motorized vehicles seasonally (during the summer). There also are approximately 8 miles of NFS roads open to all vehicles during the summer (June 1 to September 15) and open to motor vehicles 50 inches wide or less year-round. The roads listed in **Table N-4** are displayed on the maps in **Appendix N-1**; however, due to scale, not all of the roads have labels.

In the winter (generally from November 1 to May 15), there are 96 miles of groomed OSV routes on 14 NFS roads in the analysis area (see **Table N-5** in **Appendix N-1**). There also are approximately 4 miles of infrequently groomed OSV routes on 2 NFS roads, Burnt Log Road (FR 447) and West Fork Creek Road (FR 600). Approximately 10 miles of the South Fork Salmon River Road (FR 50674/474) (in the analysis area) are plowed in the winter.

As mentioned above, there are state and county roads that provide access to the analysis area. In total, the analysis area also includes over 110 miles of local, county, state, and private roads that may be used for motorized recreation or to access NFS motorized recreation routes (see **Table N-6** in **Appendix N-1**). Portions of several of these roads also are plowed in the winter, allowing winter access to the analysis area (see **Table N-7** in **Appendix N-1**).

Some recreationists choose to fly into the area rather than drive. The closest public airstrips are the Johnson Creek airstrip in BNF MA 21 south of Yellow Pine and a public airstrip at Big Creek in PNF MA 13, which serves local landowners and recreationists (Forest Service 2003a).

3.19.3.4 Recreation Setting

Recreation opportunity, as defined in the ROS User's Guide (Forest Service 1982), 'is the availability of a real choice for a user to participate in a preferred activity within a preferred setting, in order to realize satisfying experiences that are desired.' The management of recreation opportunities is accomplished by the Forest Service through use of the ROS. The ROS is a system for classifying and managing recreation opportunities based on the physical setting, social setting, and managerial setting. The physical setting is defined by the type of access, the level of remoteness, and the size of the area. The social setting is defined by user density, including the amount and type of interaction between individuals (i.e., parties per day encountered). The managerial setting is defined by the level of visitor management (regulations and information), facilities and site management, and degree of naturalness.

The combination of the three settings results in six different ROS classes: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural, and Urban (**Table 3.19-1**) (Forest Service 1982). Because recreation access and type changes across seasons, ROS classification also may vary by season. For example, areas where motorized travel is prohibited during the summer may be open to OSV use during winter. Though not a designated ROS class listed in **Table 3.19-1**, Roaded Modified also is used as an ROS class in the analysis area. Roaded Modified is a subset of Roaded Natural; it includes a higher density of roads and may have management activities that dominate the landscape (Forest Service No Date).

Table 3.19-1 Recreation Opportunity Spectrum Classes

ROS Class	Description
Primitive	Area characterized by essentially an unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and control. Motorized use in the area is not permitted.
Semi-Primitive Non-Motorized	Area is characterized by a natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted.
Semi-Primitive Motorized	Area is characterized by a natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is permitted.

ROS Class	Description
Roaded Natural	Area is characterized by natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.
Rural	Area is characterized by a substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sight and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate visitor densities are provided for away from developed sites. Facilities for intensified motorized use and parking are available.
Urban	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resources modification and utilization practices are to enhance specific recreational activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans on-site are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motorized use and parking are available, with forms of mass transit often available to carry people throughout the site.

Table Source: AECOM 2020; Forest Service 1982

3.19.3.4.1 DESIGNATED ROS CLASSES

Designated ROS classes were identified for the analysis area through review of the Payette National Forest Land and Resource Management Plan (Payette Forest Plan) (Forest Service 2003a) and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2010). ROS geographic information system data managed by the PNF and BNF were overlaid on the analysis area to determine applicable ROS designations in the analysis area. Maps of existing designated ROS classes in the analysis area are in **Appendix N-1** (both summer and winter designated ROS classes). The following text describes the applicable areas designated for each ROS category in the analysis area.

As discussed above, ROS classes can vary by season, which is the case in the analysis area. Designated summer ROS classes in the analysis area include Rural, Roaded Natural, Roaded Modified, Semi-Primitive Motorized, Semi-Primitive Non-Motorized, and Primitive.

3.19.3.4.1.1 Summer ROS classes

Rural: The area near Warm Lake, including most recreation amenities and summer homes, is the only area classified as Rural in the analysis area.

Roaded Natural: The areas surrounding primary access roads are classified as Roaded Natural, including the area surrounding the Stibnite portion of McCall-Stibnite Road (CR 50-412), Thunder Mountain Road (FR 50375), Meadow Creek Lookout Road (FR 51290), Big Creek Road, Warren-Profile Gap Road (FR 50340), Johnson Creek Road (CR 10-413), Warm Lake Road (CR 10-579), South Fork Salmon River Road (FR 50674/474), and Clear Creek Road (FR 409). The Landmark area also is designated as Roaded Natural.

Roaded Modified: Roaded Modified is a subclass of Roaded Natural and is associated with the area surrounding several NFS roads (North Fork Gold Loop [FR 402], Boulder Rock [FR 403], East Fork Clear Creek [FR 405], Horsethief-Clear Creek [FR 406], Lost Basin Cutoff [FR 407], Horn Creek [FR 414], Lunch Creek [FR 415], Horse Heaven [FR 416W], Snag Creek [FR 425], Sand Creek [FR 437], Old Thunder Mountain [FR 440], Springfield Mine [FR 440A], North Fork Sulphur Creek [FR 442], Burnt Log [FR 447], East Fork Burntlog Creek [FR 448], Buck Creek [FR 451], Sheep Creek [FR 454], Pid Creek [FR 455], Golden Hill [FR 456], and Cabin Creek [FR 467]), the mine site, and the Thunder Mountain area. The area surrounding the majority of minor NFS roads and trails around the Warm Lake area also are classified as Roaded Modified, including the area around the following roads: Bear Creek (FR 470), Camp Creek (FR 471), Lodgepole Creek (FR 472), Rice Creek (FR 478), Tyndall Creek (FR 483), Sixbit (FR 493), and Dollar Creek (FR 495).

Semi-Primitive Motorized: Areas classified as Semi-Primitive Motorized include forest trails near Riordan Lake (FT 097 Riordan Lake, FT 081 Bear-Riordan, and FT 073 Meadow Creek), trails south of Warm Lake (FT 108 Lodgepole Creek, FT 076 Rock Creek, FT 161 Blue Point Ridge, FT 107 Tyndall Creek, FT 101 Yellow Jacket), and trails west of Warm Lake (FT 115 Needles Route, FT 114 Dollar Creek Way).

Semi-Primitive Non-Motorized: Areas designated as Semi-Primitive Non-Motorized include Clear Creek Summit and Thunderbolt Mountain, as well as areas near Buck Mountain, Burnt Log Creek, Landmark Rock, and Oro Mountain. A large portion of PNF MA 13 is classified as Semi-Primitive Non-Motorized, including areas throughout the central and western portions of the management area. A large portion of BNF MA 21 also is classified as Semi-Primitive Non-Motorized, including areas near Horse Heaven/Meadow Creek west of the mine site, Meadow Ridge, Trapper Flat, and the Buck Mountains.

Primitive: The FCRNRW east and south of Meadow Creek Lookout Road (FR 51290) is designated as Primitive; no ROS geographic information system (GIS) data was available for the wilderness area around or north of Thunder Mountain Road (FR 50375).

3.19.3.4.1.2 Winter ROS classes

In the winter, PNF MA 13, BNF MA 21, and BNF MA 20 are primarily classified as Semi-Primitive Motorized with some exceptions. In PNF MA 13 there are Semi-Primitive Non-Motorized areas along the FCRNRW boundary north of Big Creek and north and east of Stibnite Road (CR 50-412), with the mine site and Thunder Mountain areas classified as Roaded Modified in the winter. A small portion of the area surrounding Stibnite Road (CR 50-412) is designated as Roaded Natural in the winter. In BNF MA 21, Yellow Pine, a portion of the area surrounding Johnson Creek Road (CR 10-413) (between Yellow Pine and Wapiti Ranch) and area surrounding Stibnite Road (CR 50-412) are designated as Roaded Natural. In BNF MA 20, an isolated area east of Burnt Log Road (FR 447) adjacent to the wilderness area is designated as Semi-Primitive Non-Motorized. In BNF MA 17, the ROS class surrounding Warm Lake Road (CR 10-579) remains Roaded Natural in the winter and the area east of Big Creek is classified as Semi-Primitive Motorized. In BNF MA 19, Warm Lake remains classified as Rural and

Roaded Natural along Warm Lake Road (CR 10-579) and South Fork Salmon River Road (FR 50674/474) north of Warm Lake because these routes are plowed for winter recreation users. The remainder of the management area is primarily Semi-Primitive Motorized in the winter except for an isolated area near Thunderbolt Mountain that is classified as Semi-Primitive Non-Motorized. Similar to the summer, the FCRNRW east and south of Meadow Creek Lookout Road (FR 51290) is designated as Primitive; no ROS GIS data was available for the wilderness area around or north of Thunder Mountain Road (FR 50375).

Acreage of designated summer and winter ROS classes within the analysis area are listed in **Table N-8** in **Appendix N-1**. Maps illustrating existing designated summer and winter ROS classes are provided in **Appendix N-1**.

3.19.3.5 ROS Physical Setting

Physical setting of an ROS class is defined by the absence or presence of human sights and sounds, physical size of an area, and the amount of environmental modification caused by human activity (Forest Service 2003b). This setting is established through three criteria: remoteness, size of area, and evidence of humans. These criteria are described as follows:

- **Remoteness:** Remoteness from the sights and sounds of humans is used as an indicator of the opportunity to experience greater or lesser amounts of social interaction, and primitive to urban influences, as one moves across the spectrum.
- **Size of Area:** Size of area is used as an indicator of the opportunity to experience self-sufficiency as related to the sense of vastness of a relatively undeveloped area. In some settings, application of the remoteness criteria ensures the existence of these experience opportunities; in other settings the remoteness criteria alone do not.
- **Evidence of Humans:** Evidence of humans is used as an indicator of the opportunity to recreate in environmental settings having varying degrees of human influence or modification.

The physical setting criteria generally correspond to ROS classes; however, ROS physical settings are not always consistent with the overall ROS class because the influence of social and managerial settings is not considered in the physical settings. The ROS physical setting is considered specifically within this document because it is possible to quantify the changes to the physical setting due to development, roads, winter road maintenance, etc. whereas that would not be feasible for the social and managerial settings. The existing ROS physical setting in the analysis area was mapped for summer and winter seasons by combining the three criteria outlined above (remoteness, size, and evidence of humans) using guidance from the National ROS Inventory Mapping Protocol (Forest Service 2003b). Using criteria presented in **Table N-9** in **Appendix N-1**, ROS physical settings were determined based on motorized and non-motorized travel routes, including roads, motorized trails, and railroads. Motorized physical settings were classified as either Semi-Primitive Motorized or Roaded Natural. Non-motorized areas were classified as either Primitive or Semi-Primitive Non-Motorized based on size criteria.

Refinement of Primitive and Semi-Primitive Non-Motorized physical settings was conducted by assessing the adjacent physical setting. Areas isolated by topography, but smaller than the minimum size requirement, were mapped as Semi-Primitive Non-Motorized. Areas surrounded by Semi-Primitive Motorized settings were mapped as Semi-Primitive Motorized because this setting contributes to the semi-primitive character, although motorized use is not allowed. Roaded Natural settings were mapped for roads that are plowed in winter yet are more isolated from the sights and sounds of other people.

Rural settings were classified using professional judgment because more than one class could be feasible based on operational maintenance levels. Cascade, Warm Lake, Landmark, and Yellow Pine were identified as having a Rural physical setting that extended between 0.5 mile and 5 miles. These areas are characterized by a substantially modified natural environment where comfort and convenience are part of the experience. Facilities are readily apparent and may include homes, utility corridors, resorts, and developed recreation areas. Roads, either paved or gravel, provide a range of opportunities for users in passenger cars, recreational vehicles, or trailers. Roads with a Forest Service maintenance classification of either 4, 5, or “Passenger Car” also were identified as having a Rural setting due to the presence of improved roads, transmission lines, and developed recreation sites, which contribute to a culturally modified setting.

The analysis area experiences a shift in ROS physical setting between summer and winter, primarily due to limited accessibility due to snow-cover. Roads and trails are obscured to recreation users and snow-cover provides overland travel opportunities that are not available during summer. Development of the winter ROS physical setting was based on the PNF and BNF winter travel management and criteria. Access is highly restricted in the analysis area and limited routes are plowed throughout the winter to permit passenger cars. Winter physical settings were categorized as follows:

- Areas identified as “closed to motorized use” were classified as Semi-Primitive Non-Motorized as use of OSVs for overland travel are prohibited in these areas.
- Roads managed for OSV use, including groomed and ungroomed routes, were classified as Semi-Primitive Motorized. It was assumed that motorized overland travel is permissible in areas identified as “open to snow.”
- During winter, areas surrounding roads that are plowed in more developed areas were classified as Rural or Roaded Natural because facilities are apparent despite the snow cover.

Assumptions used to generate ROS physical settings were based on type of access and size of area under both summer and winter conditions. Criteria and assumptions used to determine each setting are provided in **Tables N-9, N-10,** and **N-11** in **Appendix N-1**.

The estimated summer ROS physical settings vary from the designated ROS classes in some areas. Portions of the FCRNRW that are designated as Primitive or with no ROS GIS data but located in the wilderness were determined to have a physical setting of Semi-Primitive Non-

Motorized based on the adjacent physical setting and size. Interior wilderness areas further from existing roadways were determined to have a physical setting of Primitive, matching the existing ROS designation of Primitive. Areas north of Big Creek, some drainages north of Stibnite Road (CR 50-412), and the areas around the mine site that are designated Semi-Primitive Non-Motorized were determined to have a physical setting of Semi-Primitive Motorized. The Stibnite Road (CR 50-412) area, Warm Lake Road (CR 10-579) area west of Landmark, Johnson Creek south of Landmark, and South Fork Salmon River Road (FR 50674/474) area are designated as Roaded Natural; however, these areas have a summer physical setting of Rural. Other areas designated as Roaded Natural have a summer physical setting of Semi-Primitive Motorized. Many areas designated as Roaded Modified have a physical setting of Semi-Primitive Motorized. However, areas designated as Roaded Modified west of the South Fork Salmon River and west of the South Fork Salmon River Road (FR 50674/474) have a physical setting of Semi-Primitive Non-Motorized. Another exception is along Clear Creek Road (FR 409) and in the Skunk Creek area, which have a physical setting of Roaded Natural.

In the winter, the main difference between designated ROS classes and physical settings is along Stibnite Road (CR 50-412), Johnson Creek Road (CR 10-413), Warm Lake Road (CR 10-579), and South Fork Salmon River Road (FR 50674/474). The areas surrounding these roads are designated as Roaded Natural and Semi-Primitive Motorized, but have physical settings of Rural because these routes are plowed during the winter (unplowed portions are Semi-Primitive Motorized Groomed). Another main difference between designated ROS classes and physical settings are that many areas that are designated Roaded Modified have a physical setting of Semi-Primitive Motorized. However, the areas designated as Semi-Primitive Non-Motorized also have a physical setting of Semi-Primitive Non-Motorized in the winter. Areas with a physical setting of Primitive in the winter are similar to those described above for the summer.

Estimated summer and winter ROS physical settings in the analysis area are provided in **Table N-12** in **Appendix N-1**. Maps illustrating these estimated summer and winter physical settings are provided in **Appendix N-1**.

3.19.3.6 Recreation Use and Users

Recreation use occurs throughout NFS, state, and private lands in the analysis area. Developed recreation use is limited to the developed recreation sites (i.e., overnight facilities) located primarily in the Warm Lake, Landmark, and Johnson Creek Road areas. Most recreation in the analysis area is dispersed use, such as hunting, fishing, hiking, backpacking, and all-terrain vehicle use, which occurs outside of these developed recreation sites. Dispersed recreation use occurs year- round in the analysis area and is a primary use of all five management areas (Forest Service 2003a, 2010). Motorized use typically occurs on NFS trails and roads while non-motorized uses generally occur in the FCRNRW, Inventoried Roadless Areas, and on non-motorized trails.

Although there are general visitation estimates available for the PNF (Fiscal Year 2018) and BNF (Fiscal Year 2014) as part of the National Visitor Use Monitoring Program, visitor use estimates are not available for specific management areas in the PNF or BNF in the analysis area. Based on estimates from the National Visitor Use Monitoring data, undeveloped areas received over 50 percent of the estimated visits in both forests (**Table 3.19-2**). Developed area use was higher in both forests at developed day use sites than at developed overnight sites. Use at developed day use areas was about 32 percent of visits for PNF and 37 percent of visits at BNF compared to overnight use, which was only about 5 percent of visits for PNF and 12 percent of visits for BNF. There were no wilderness visits estimated at BNF. However, at PNF, wilderness use accounted for about 1 percent of total visits. Overall, the BNF was estimated to receive over 45 percent more visits than the PNF (Forest Service 2019a,b, 2020a,b).

Table 3.19-2 Annual Visitation Use Estimate by Site Type for PNF (Fiscal Year 2018) and BNF (Fiscal Year 2014)

Site Type	PNF[1]	BNF[2]
	Visits[3]	Visits[3]
Day Use Developed	164,000	285,000
Overnight Use Developed	25,000	87,000
Undeveloped Areas	326,000	383,000
Wilderness	5,000	0
Total	**519,000**	**756,000**

Table Source: AECOM 2020; Forest Service 2019a,b, 2020a,b

Table Notes:

1 For Fiscal Year 2018.

2 For Fiscal Year 2014.

3 A site visit is the entry of one person onto a National Forest site or area to participate in recreation activities for an unspecified period of time.

The Payette Forest Plan provides information on recreational use in PNF MA 13. Recreation is considered a major use in the Big Creek area of PNF MA 13 (Forest Service 2003a), while the “remainder of the management area receives low to moderate dispersed use associated mainly with the Big Creek/Edwardsburg area, Missouri Ridge and Monumental Creek Trails into the Wilderness [FCRNRW], and with high mountain lakes in the upper Profile Creek drainage” (Forest Service 2003a).

Recreation users in the analysis area are mostly locals, originating from areas in the analysis area such as Yellow Pine, Warm Lake, Big Creek/Edwardsburg, and areas just west of the analysis area including Cascade and Long Valley (Forest Service 2010). Users particularly in the western portion of the analysis area also are from populated areas further south including Treasure Valley and Boise (Forest Service 2010). As noted in the Payette Forest Plan for PNF MA 13, though most use is local, “users come through the area from all over the country to use the adjacent Wilderness [FCRNRW], especially during big-game hunting seasons” (Forest Service 2003a).

3.19.3.7 Special Recreation Use Permits

The IOGLB issues state licenses to commercial outfitters and guides in the state of Idaho and is responsible for the administration of the Idaho Outfitters and Guides Act (Title 35, Chapter 21, Idaho Code), while the Forest Service authorizes outfitter/guide services and facilities on NFS lands.

The Idaho Department of Fish and Game has divided the state into 78 game management units (GMUs) to aid in wildlife and hunting management. The five management areas in the analysis area overlap three Idaho Department of Fish and Game GMUs: 24, 25, and 26. There are 24 outfitters and guides permitted in GMU 24, 14 permitted in GMU 25, and 37 permitted in GMU 26 (IOGLB 2020a-c). GMU 26 is primarily in the FCRNRW and includes a portion of PNF MA 13. Only BNF MA 17 is in GMU 24. BNF MAs 19, 20, and 21, and most of PNF MA 13 are in GMU 25. Maps showing these GMUs are included in **Appendix N-1**.

In all three GMUs, activities permitted by the IOGLB, which vary by outfitter, include trail rides/pack trips, mountain bike touring, backpacking, photo trips, day hikes, snowmobiling, and fishing. In GMUs 24 and 25, permitted activities also include llama packing and skiing/snowshoeing. The IOGLB also has permitted kayaking and float boating in GMUs 24 and 26. In GMU 24, wagon/sleigh rides, zip line tours, mountaineering, and powerboating also are permitted.

In the three GMUs, several of the permitted outfitters also are permitted for hunting (five in GMU 24, nine in GMU 25, and 26 in GMU 26). In all three GMUs, outfitters are permitted to hunt bear, cougar, predators, wolf, elk, deer, moose, and forest grouse (species vary by outfitter). In GMUs 25 and 26, species permitted for hunting also include goat, sheep, and chukar (IOGLB 2020a-c).

In 2019, there were several recreation-related special use permits issued by the Forest Service within the analysis area: three lodges, one bicycle event, four outfitters and guides, two organizational camps, and 62 recreation residences. Permits issued for the PNF include a lodge, biking event, and three outfitters and guides, while permits issued for the BNF include one outfitter and guide, two lodges, two organizational camps, and 62 recreation residences. All but one of the recreation-related special use permits issued for the BNF are in the Warm Lake area. **Table N-13** in **Appendix N-1** describes each of the current recreation-related special use permits that have been issued within the analysis area.

3.20 SCENIC RESOURCES

3.20.1 Scope of Analysis

Scenic resources are the visible physical features on the landscape (e.g., land, water, vegetation, structures, and other features). This section describes the existing qualities of the landscape, as well as people's scenic experiences of the landscape. The analysis area for scenic resources includes all areas where visual resources would potentially be affected by the Stibnite Gold Project (SGP) and/or SGP components would be potentially visible to the public (**Figure 3.20-1**). The analysis area extends north of and along the East Fork Road segment and the Stibnite Road segment of the McCall-Stibnite Road (County Road [CR] 50-412), to the east into portions of the Frank Church-River of No Return Wilderness (FCRNRW), south of and along Warm Lake Road (CR 10-579), and west of Lake Cascade.

3.20.2 Relevant Laws, Regulations, Policies, and Plans

3.20.2.1 Visual Management System

The Visual Management System (U.S. Forest Service [Forest Service] 1974) has been used since the mid-1970s as the preferred analysis tool for determining effects to scenery from proposed activities and is the basis of this analysis. All National Forest System lands have been inventoried in accordance with the Visual Management System, as described below, to provide measurable standards for the management of scenic resources and Visual Quality Objectives (VQOs) (Forest Service 1974):

- *Character Type* is an area of land that has common distinguishing visual characteristics of landform, rock formations, water forms, and vegetative patterns.
- *Characteristic Landscape* is the naturally established landscape being viewed.
- *Variety Classes* classify landscapes into different degrees of variety: A – Distinctive, B – Common, and C – Minimal.
- *Distance Zones* are the portions of a particular landscape seen from roads, trails, use areas, and waterbodies. The three distance zones are: foreground (extends 0.25 to 0.5 mile from observer), middle ground (extends from foreground 3 to 5 miles), and background (extends from middle ground to horizon).
- *Sensitivity Levels* are a measure of people's concern for the scenic quality of the National Forests (Forest Service 1974): Level 1 – Highest Sensitivity, Level 2 – Average Sensitivity, and Level 3 – Lowest Sensitivity. Forest Service sensitivity levels are determined for the land viewed from use areas, travel routes, and waterbodies.

Combining these attributes, all national forests assign a VQO to be used during project planning and implementation for the purpose of maintaining or enhancing the scenic qualities of the forest's landscapes. VQOs are measurable standards or objectives that guide management of these lands and represent different degrees of acceptable alterations to national forest landscapes. The following are definitions of the five VQOs from the National Forest Landscape Management Volume 2, Chapter 1 of the Visual Management System (Forest Service 1974):

- “*Preservation (P)* – This VQO allows ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.”
- “*Retention (R)* – This VQO provides for management activities that are not visually evident. Under Retention, activities may only repeat form, line color, and texture frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc. should not be evident.”
- “*Partial Retention (PR)* – Management activities remain visually subordinate to the characteristic landscape when managed according to the Partial Retention VQO. Activities may repeat form, line, color, or texture common to the characteristic landscapes but changes in their qualities of size, amount, intensity, direction, pattern, etc. should remain visually subordinate to the characteristic landscape. Activities also may introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.”
- “*Modification (M)* – Under the modification VQO management activities may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.”
- “*Maximum Modification (MM)* – Management activities of vegetative and land alterations form may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations also may be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground.”

In general, VQOs for highly scenic and/or highly sensitive and visible landscapes require the retention of a natural appearance yet would allow for activities with a low level of visual change. A greater degree of landscape alteration is acceptable in landscapes that are inherently less scenic, seen from a greater distance, or seen from less sensitive locations.

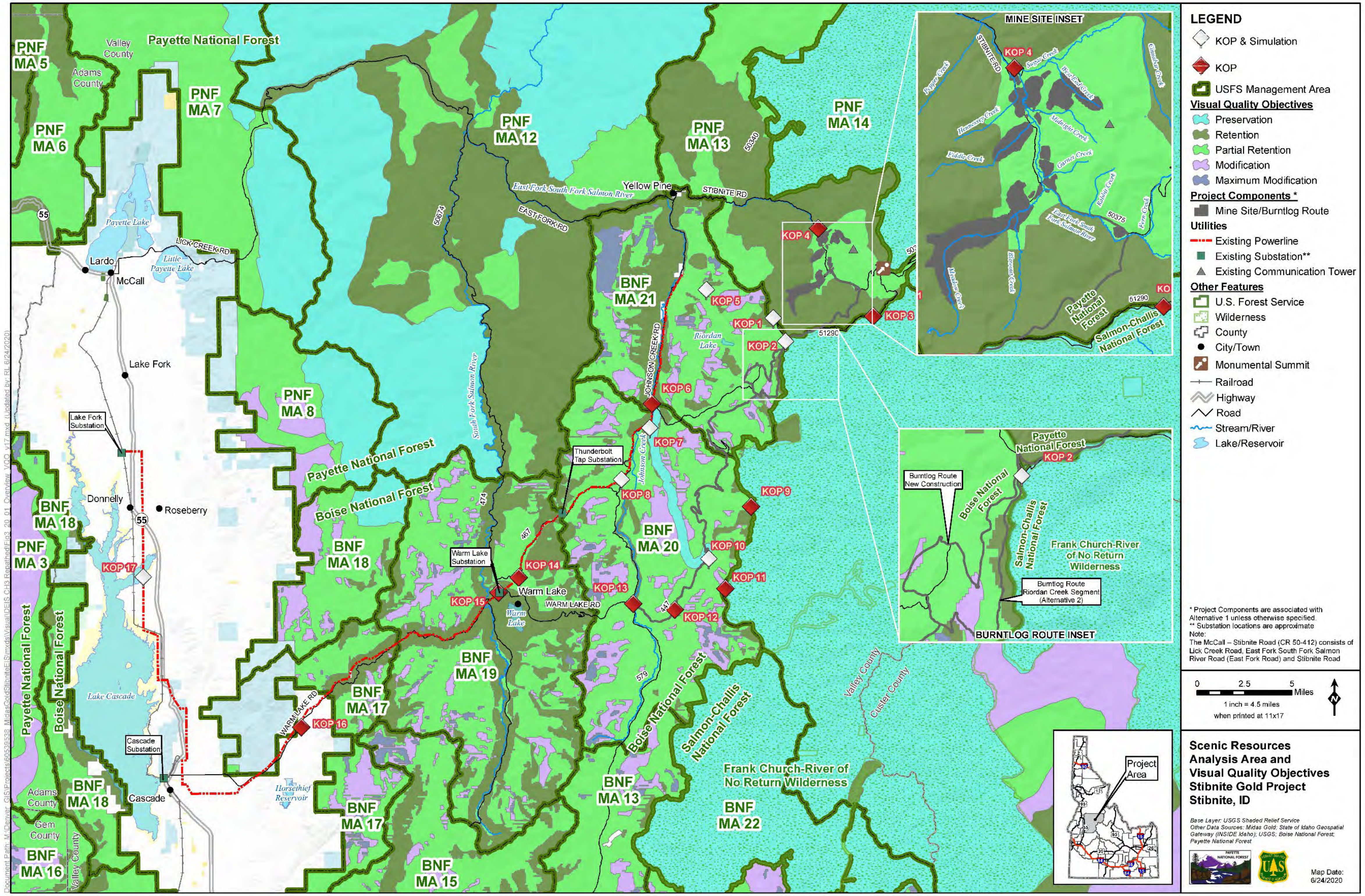

Figure Source: AECOM 2020

Figure 3.20-1 Scenic Resources Analysis Area and Visual Quality Objectives

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3.20.2.2 National Forest Land and Resource Management Plans

The Payette National Forest Land and Resource Management Plan and Boise National Forest Land and Resource Management Plan (Forest Service 2003, 2010) each state that the desired condition for the scenic environment is that "scenic quality is maintained or enhanced in areas of high scenic value and other highly used recreation areas." The following goals and standards have been developed in support of this desired condition and are pertinent to the SGP.

Goals:

- SCGO01 – Manage the Forest's scenic resources to maintain the recreation and visual resource values while meeting other resource needs.

Standards:

- SCST01 – All projects shall be designed to meet the adopted VQOs as identified in Management Area direction and represented on the Forest VQO map.
- SCST02 – Allow for short-term reductions in VQOs to accommodate Burned Area Emergency Rehabilitation projects, emergency needs for protection of investments, and public safety needs. When reducing VQOs, attempt to meet the next-highest objective at the closest viewer distance or most relevant distance given the probably sensitive viewer.

The management plans include maps showing the VQOs in each management area and the specific guidelines that apply to actions in those management areas.

3.20.2.3 Bureau of Reclamation

The U.S. Bureau of Reclamation Lake Cascade Resource Management Plan (U.S. Bureau of Reclamation 2002) includes Goals and Objectives that pertain to Scenic Resources on land that it manages. The pertinent goals are:

- **Scenic Quality Goal NAT 5:** Protect the scenic quality and open space values on Reclamation lands at Lake Cascade.
    - Objective NAT 5.1: Ensure that siting and design of all new facilities on Reclamation lands maximize compatibility and integration with the open, rural environment of the reservoir and surrounding area.
- **Land Use, Access, and Implementation Goal LAI 1**: Balance the need for expansion of recreation opportunities (or other development) with preservation of open space and scenic values.

3.20.2.4 Valley County Comprehensive Plan

The purpose of the Valley County Comprehensive Plan is to promote the health, safety, and general welfare of the people of the State of Idaho, in part, to ensure that "the development on land is commensurate with the physical characteristics of the land" (Valley County 2018). The plan contains land use goals related to scenic resources and the rural character of the landscape. Specifically, Land Use Goal I states, “Retain the rural atmosphere of Valley County by protecting its natural beauty and open characteristics and preserving its historical and scenic beauty.”

3.20.2.5 Payette River National Scenic Byway

The Payette River National Scenic Byway is located on State Highway 55 between Eagle and New Meadows, Idaho, which serves as an important corridor for tourist traveling between Boise and central Idaho. The Payette River Scenic Byway (PRSB) Corridor Management Plan notes that the PRSB Advisory Council does not have regulatory authority and relies on Valley County and the communities along the corridor to preserve the scenic qualities of the PRSB (PRSB Advisory Council 2013). The plan does not specify guidance with regard to scenic resource management along the corridor; however, the PRSB Advisory Council “will collectively review all zoning ordinance proposals to determine if the ordinances support principal goals by preserving historic or culturally valuable assets and viewsheds, [and] limit undesired land uses within close proximity of the byway…”

3.20.2.6 City of Cascade

The City of Cascade Comprehensive Plan (City of Cascade 2017) recognizes Natural Resources as a management element that includes scenic resources as part of Goal 4.1, which states, “Protect wildlife habitat, the environmental and hydrologic functions of lands and streams, and scenic vistas.” The City of Cascade Comprehensive Plan also identifies State Highway 55 (PRSB) as a scenic corridor with qualities that attract visitors. It also identifies mountain ranges surrounding Cascade and the riparian corridor along Payette River as critical areas for scenic resources.

3.20.2.7 City of Donnelly

The City of Donnelly Comprehensive Plan (City of Donnelly 2014) identifies goals and policies related to Community Design. One of the city’s goals is to, “Preserve and enhance the visual appearance and unique character of the City,” and its second objective is to “Preserve and enhance the landscape views around the City.” Policy 3 states that, “Utilities shall be installed underground whenever possible to minimize visual impacts.” Goals and policies related to Public Services and Utilities includes the following objective, “Provide adequate public utility infrastructure to meet the needs of current and future residents while minimizing its visual impact.”

3.20.3 Existing Conditions

3.20.3.1 Characteristic Landscape

The analysis area is in the Northern Rocky Mountain Province of the Rocky Mountain System in central Idaho (Fenneman 1931). This province bears large tracts of mountains that have no trend and no dominating crest, only a multitude of minor crests in all directions between the streams of a mature drainage system. Neighboring divides are often at the same height, and when viewed from a superior (viewed from above) open viewpoint, the skyline may appear almost horizontal. Generally, the landscape is characterized as a continuous mountain landscape broken occasionally by wide valleys with flat or hilly floors 2,000 to 5,000 feet below the mountain crests. Valley widths may range from 5 to 10 miles, and their length is often greater, similar to Long Valley where the cities of Cascade and Donnelly reside. In most instances, the valleys are narrow, rugged gorges.

In the southwest portion of the analysis area, just southeast of Cascade, Long Valley is about 5,000 feet above mean sea level. Land uses in the valley include agriculture, rural, and some urban development. Vegetation in the valley primarily consists of those types typically associated with agricultural practices, including a variety of grass species (HDR, Inc. 2015). In the Payette National Forest and Boise National Forest, including the proposed mine site and vicinity, numerous boulder and rock outcroppings are evident along ridgelines. Vegetation is characterized by upland forest plant communities, which typically include evergreen overstory species and wetland/riparian plant communities, which are located throughout the analysis area along pastures, adjacent to streams and hillside seeps.

The dark green color of the tall, dense evergreens tends to be the most visually dominant color throughout the analysis area. Where soils are visible in the analysis area, colors typically range from tan to brown in color. Several light grey rock outcroppings and boulder fields are scattered throughout the landscape at higher elevations. Rock outcroppings occasionally break up the monochromatic greenery and add texture to the setting. Understory vegetation and grasses in the valley change seasonally, ranging from tan to brown in the fall/winter to green in the spring and summer. Snow often covers most of the landscape from late fall to early spring, contrasting with the dark evergreen trees.

Large portions of the analysis area have been affected by past wildfires leaving blackened, dead, and burned trees with sparse understory vegetation. In areas affected by fire, the rugged and rocky terrain becomes the dominant feature, and tall grayish-black trees are scattered across the burned landscape. Understory vegetation is not very diverse and often occupied by grasses and shrubs, primarily fireweed, which blankets the landscape in bright pink when in bloom. Old road cuts stand out in burned areas as the absence of live vegetation makes them contrast with surrounding areas.

Human development is noticeable throughout the analysis area including roads, trails, fences, utility lines, and airstrips. Other structures within the analysis area include cabins, residences, barns, and outbuildings. Historic mining disturbances, such as access roads, historic mining pits, waste rock disposal areas, heap leach pads, and a spent ore disposal area, are present at the proposed mine site. At the mine site, existing modifications to the landscape have introduced monolithic landforms of an industrial scale that exhibit bold form, strong lines, contrasting color, and vegetation patterns and textures that do not blend into the natural landscape.

The East Fork South Fork Salmon River flows through the mine site and forms a human-made lake at the bottom of the existing Yellow Pine pit with riparian vegetation along some areas of the pit wall. Existing access roads and pit benches in this area exhibit strong lines and geometric forms with varying degrees of texture and color contrasts.

3.20.3.2 Sensitive Use Areas

Visual sensitivity pertains to the degree of concern for changes to the characteristic landscape. Sensitive use areas were identified based on the following criteria: use duration, use volume, Forest Plan sensitivity level, and scenic or special designation. Existing conditions of sensitive use areas are summarized in the text below. All areas identified as sensitive use areas in this analysis have an overall sensitivity of high or moderate. Seventeen Key Observation Points (KOPs) were established throughout the analysis area as shown on **Figure 3.20-1**. Data sources used to select representative KOPs included: viewshed analysis results, existing land use plans, recreation data, aerial photography, and Forest Plan VQO data. These data were reviewed in conjunction with the proposed SGP components to provide a comprehensive evaluation of the varied components and their potential impacts to sensitive viewer locations within the analysis area. The KOPs represent different types of sensitive use areas (roads, trails, recreation use areas, and residential areas) and areas where different SGP components could be visible. Existing conditions are assessed at each KOP and used to evaluate potential impacts from the SGP. Photographs taken from select KOPs are included in **Appendix O-1**, Key Observation Point Simulation Photos.

3.20.3.2.1 TRAVEL ROUTES

There are 27 roads, including highways, forest roads, and local roads, in the analysis area identified as sensitive use areas. These roads provide access for forest visitors to the two national forests, the FCRNRW, the mine site, recreation sites that include Warm Lake and the Stolle Cabin, and numerous campgrounds and trailheads, as well as serve as travel routes for the residents of the Village of Yellow Pine. Most roads are seasonal and closed during winter months due to snow. However, Stibnite Road (CR 50-412), Warm Lake Road (CR 10-579), South Fork Salmon River Road (National Forest System Road 474/50674), and the northern portion of Johnson Creek Road (CR 10-413) are accessible to vehicles year-round. Views experienced from travel routes are transient in nature and include “superior” (views from above), “inferior” (views from below), and enclosed views; although, expanded views exist in areas where adjacent vegetation is sparse and/or low growing. Six KOPs (4, 10, 13, 14, 15, and 16) are identified along travel routes.

3.20.3.2.2 WATERBODIES

There are six rivers and creeks and two lakes (Warm Lake and Lake Cascade) in the analysis area identified as sensitive use areas that are used by residents and forest visitors for motorized boating, rafting, swimming, wildlife viewing, and fishing. Near the mine site, the East Fork South Fork Salmon River is accessible for dispersed recreation. Johnson Creek is accessible for water-based recreation at numerous campgrounds and dispersed campsites throughout the analysis area. Summit Lake, Caton Lake, Rainbow Lake, Curtis Lake, Black Lake, and Riordan

Lake are other major bodies of water that are accessible for dispersed recreation. Johnson Creek and Burntlog Creek are eligible for designation as Wild and Scenic Rivers (recreational and wild, respectively), and the South Fork of the Salmon River is suitable for designation as a recreational Wild and Scenic River. Warm Lake, Horsethief Reservoir, Lake Cascade, and the North Fork of the Payette River also are located in the analysis area and offer several recreation amenities, including campgrounds and boat launching sites. Views experienced from waterbodies include transient (from watercraft) or stationary (from the shore) and are typically inferior and enclosed to partially enclosed, meaning expansive views of adjacent scenery are not present. No KOPs were identified on or along waterbodies. Section 3.19, Recreation, and Section 3.23.2, Wild and Scenic Rivers, provide more detailed information about recreation resources and Wild and Scenic Rivers, respectively.

3.20.3.2.3 CAMPGROUNDS AND LODGING

There are 16 campgrounds in the analysis area: 11 are National Forest System campgrounds and the remaining five campgrounds and lodging facilities are non-forest service facilities. Campgrounds near the mine site are located along Johnson Creek Road (CR-10-413) close to Yellow Pine. Many of the campgrounds provide access to hiking trails and rivers or streams for fishing and recreational activities. There also are three dispersed campsites in the analysis area. Views experienced from campgrounds and other lodging areas are stationary and typically inferior and enclosed or partially enclosed. One KOP is identified at a campground (KOP 8) and two at dispersed camp sites (KOPs 6 and 12). The campgrounds identified as sensitive use areas in this analysis differ from those evaluated in Section 3.19, Recreation, because the analysis area for Scenic Resources differs from the analysis area for recreation.

3.20.3.2.4 TRAILS AND TRAILHEADS

There are numerous trails and trailheads throughout the analysis area, although notably fewer in the northern portion. The Idaho Centennial Trail is a 900-mile state-designated trail that includes motorized and non-motorized trails on the Payette National Forest and Boise National Forest. Lookout Mountain Trailhead is a supply drop location for Idaho Centennial Trail and wilderness users. Trails traverse through the forest and cross through the analysis area providing access to the FCRNRW, lakes, rivers, lookouts, campgrounds, and other various features of the analysis area and provide opportunities for viewing wildlife and scenery of the analysis area, including the FCRNRW. Views experienced from trails are transient or stationary and include superior, inferior, enclosed, and panoramic views. Four KOPs are identified along Forest Service trails (KOPs 2, 3, 7, and 9) and two at trailheads (KOPs 5 and 11).

3.20.3.2.5 OTHER RECREATIONAL USES

Other recreational use sites in the analysis area include interpretive sites, viewpoints, lookouts, swimming sites, picnic areas, and wildlife viewpoints. The Stibnite Interpretive site is located at the old Stibnite home foundations near the mine site and includes informational signage describing the past history of the town of Stibnite and mining in the area. There also is an interpretive site at Landmark that describes the historic ranger station established in 1924. Monumental Summit is a viewpoint offering 360-degree views of the forest and neighboring

FCRNRW area. There are two lookouts: Meadow Creek Lookout and Thunderbolt Mountain Lookout. Warm Lake hosts the Billy Rice Swimming Site, and the Warm Lake Picnic Point is on a small peninsula, which offers expansive views of Warm Lake and hosts a small organization's camp. South of Warm Lake, along South Fork Salmon River Road (National Forest System Road 50474), there is a point of interest for visitors to view wild salmon. Views experienced from other recreational areas are transient or stationary and include superior, inferior, enclosed, and panoramic views. One KOP is identified at Meadow Creek Lookout (KOP 1). Section 3.19, Recreation, provides an in-depth discussion of recreation. Specific recreational uses and areas included in Section 3.19, Recreation, may differ from those evaluated in this section due to the difference in the geographic extent of the analysis area.

3.20.3.3 Residences

Residences in the analysis area were inventoried as high sensitivity, due to duration of views and concern for changes in the landscape. The Village of Yellow Pine is located approximately 14 miles west of the proposed mine site at the junction of Stibnite Road (CR 50-412) and Johnson Creek Road (CR 10-413). This small community, which had a year-round population of 32 in 2018, is the nearest residential area to the mine site (Census 2018). Dispersed rural residences are generally located along Johnson Creek Road (CR 10-413) on private lands adjacent to the creek. These include Wapiti Meadows, Cox Ranch, and Bryant Ranch. The largest concentration of residential viewers on National Forest System lands within the analysis area is Warm Lake. The Warm Lake area has several seasonal residences in the Paradise Valley Summer Homes and Warm Lake Summer Homes areas. There are a few dispersed rural residences on private land off Warm Lake Highway near Scott Valley. The cities of Cascade and Donnelly are located in Long Valley near Lake Cascade and the North Fork Payette River. Several rural residences and ranches are in Long Valley, and Cascade serves as the primary logging and ranching center for residents. Several residences are located along Lake Cascade on private lands. Donnelly is at the upper end of Lake Cascade and provides access and support services to the lake and residents in the surrounding area. One KOP has been identified near the residences at Cascade (KOP 17).

3.20.3.4 Visual Quality Objectives

Of the VQOs assigned to the analysis area in the Payette National Forest Land and Resource Management Plan and Boise National Forest Land and Resource Management Plan, approximately 42,725 acres are identified as *Preservation*, 84,073 acres are identified as *Retention*, 178,118 acres are identified as *Partial Retention*, 19,709 acres are identified as *Modification,* and 1,272 acres are identified as *Maximum Modification*. The remaining 205,445 acres within the analysis area are either private, state, or other (non-Forest Service) federal land that do not have assigned VQOs. **Figure 3.20-2** illustrates these locations in the SGP vicinity. The analysis area, as shown in **Figure 3.20-1**, is the modeled viewshed for the SGP.

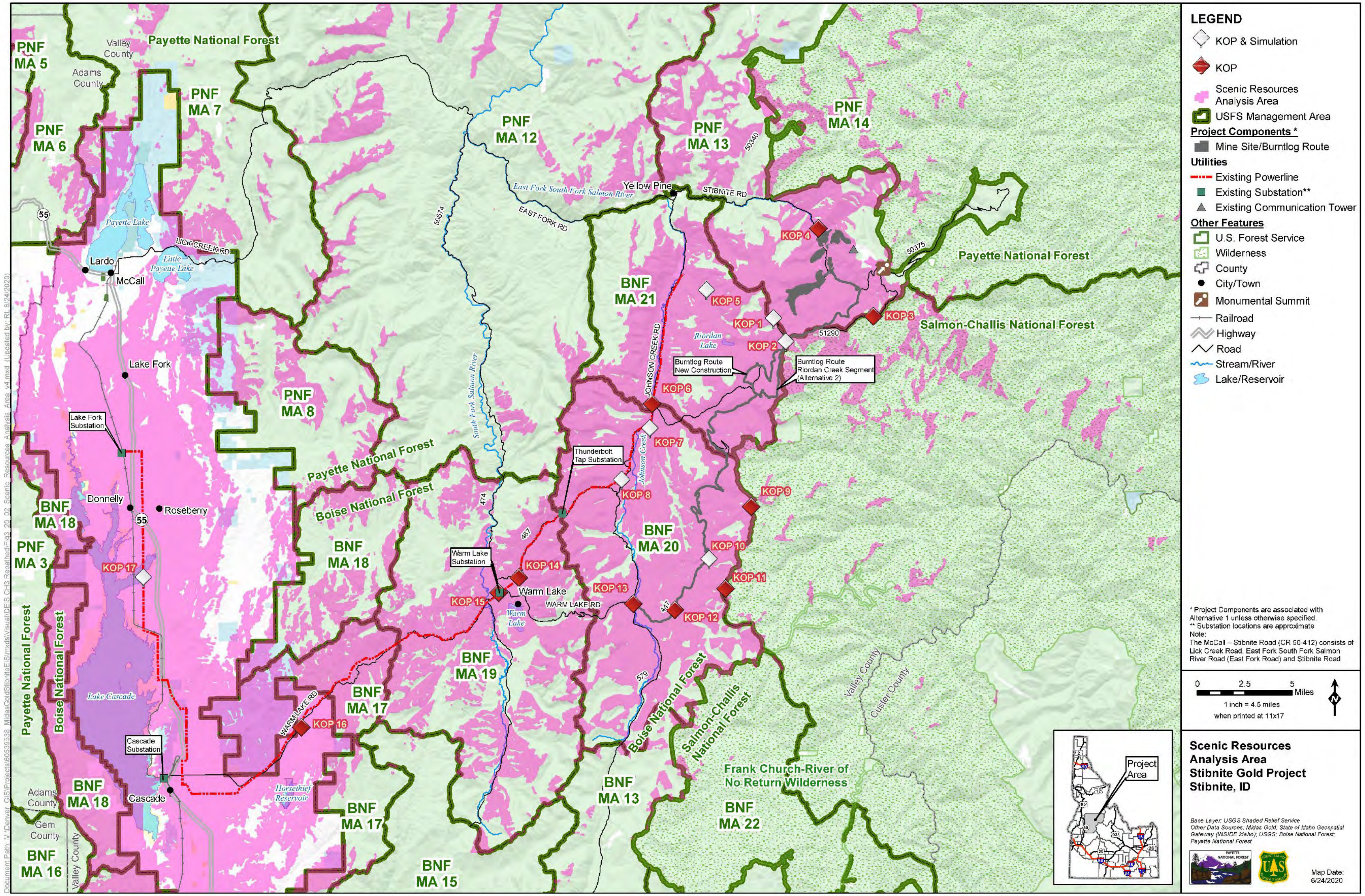

Figure Source: AECOM 2020

Figure 3.20-2 Scenic Resources Analysis Area

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3.21 SOCIAL AND ECONOMIC CONDITIONS

3.21.1 Introduction and Scope of Analysis

Social and economic conditions include a discussion of current social and economic data relevant to the proposed Stibnite Gold Project (SGP), including population and housing, income and labor, social conditions, public services, recreation use, and government revenues. The analysis area for social and economic conditions consists of the counties (and associated communities) with the potential to be directly economically affected by the SGP. Both Valley County and Adams County are included in this analysis area (**Figure 3.21-1**). Valley County, which contains the entire SGP area, and the associated communities of Cascade, Donnelly, McCall, and Yellow Pine, has the potential to be economically affected by the SGP. Adams County and the associated towns of New Meadows, Meadow Valley, and Tamarack also are included in the analysis area because of their proximity to the SGP. Access to and from the mine site would be primarily through Cascade via State Highway (SH) 55 from the south, or alternatively U.S. Route (US) 95 through Adams County and south on SH 55 to Cascade when travelling from the north, and on occasion from the south via US 95 through Council and then south on SH 55 to Cascade.

Many of the SGP's employees, contractors, and suppliers may be expected to originate from Valley and Adams counties. As a result, the SGP has the potential to affect their residents, businesses, and economies.

In addition, given its size and scope, the SGP also could have social and economic effects beyond the analysis area. As a result, this socioeconomic analysis also considers the SGP's expected impacts from a statewide perspective when appropriate. Locations outside the analysis area that may be impacted by the SGP include travel corridors potentially used as travel routes for mine products and mine employees. The communities along the Idaho SH 55 and US 95 travel corridors from Boise, Idaho, in the south to Coeur d'Alene, Idaho, in the north could potentially be affected by the SGP. In addition, the SGP also could affect communities with high populations of residents with technical mining expertise and/or businesses offering input materials, goods, and/or support services. Finally, as discussed in the environmental justice analysis in Section 3.22, Environmental Justice, because many of the local communities have mixed cash-subsistence economies, there also could be SGP-related socioeconomic impacts on the tribal populations, including members of the Nez Perce Tribe, Shoshone-Bannock Tribes on the Fort Hall Reservation, and Shoshone-Paiute Tribes on the Duck Valley Reservation, that have traditional hunting, fishing, and other rights to lands near SGP- related components. The Nez Perce Reservation encompasses portions of Nez Perce, Clearwater, Lewis, and Idaho counties in Idaho. Nez Perce Census County Subdivision (CCD) is a census-recognized subdivision within the Reservation that includes the community of Lapwai, which is the seat of the Nez Perce tribal government and has the highest proportion of tribal members as residents. In addition, the tribal headquarters, school, and casino are in the Nez Perce CCD.[1] As a result, the Nez Perce CCD, Fort Hall Reservation, and Duck Valley Reservation also are recognized as communities that could potentially experience SGP-related socioeconomic impacts (**Figure 3.21-2**).

3.21.2 Relevant Laws, Regulations, Policies, and Plans

3.21.2.1 National Forest Land and Resource Management Plans

The 2003 Payette National Forest Land and Resource Management Plan (Payette Forest Plan) and the 2010 Boise National Forest Land and Resource Management Plan (Boise Forest Plan) regulate the use of National Forest System (NFS) lands for the benefit of the nation. The Payette Forest Plan and the Boise Forest Plan both have the following goals and objectives for social and economic resources:

Goals:

SEGO01: Promote collaboration among federal, state, county, and tribal governments in land management planning, implementation, and monitoring efforts to coordinate activities and improve the effectiveness in delivery of government services.

SEGO02: Promote cooperation among stakeholders by involving them in planning, implementing, and monitoring Forest land management activities to better understand the trade-offs needed to make informed decisions.

SEGO03: Develop sustainable land uses and management strategies that contribute to economic development goals.

Objectives:

SEOB01: Provide a predictable supply of Forest goods and services within sustainable limits of the ecosystem that help meet public demand.

SEOB02: Provide opportunities for cooperation by enhancing public involvement efforts in Forest activities through the media, stakeholder workshops, personal contacts, and other methods.

These goals and objectives provide direction on procedural approaches and outcomes for management of NFS social and economic resources. However, they do not prescribe any specific guidance applicable for assessing socioeconomic impacts.

[1] Census county subdivisions and equivalent entities are statistical geographic entities established cooperatively by the Census Bureau and officials of state and local governments in 21 states where minor civil divisions either do not exist or have been unsatisfactory for reporting statistical data.

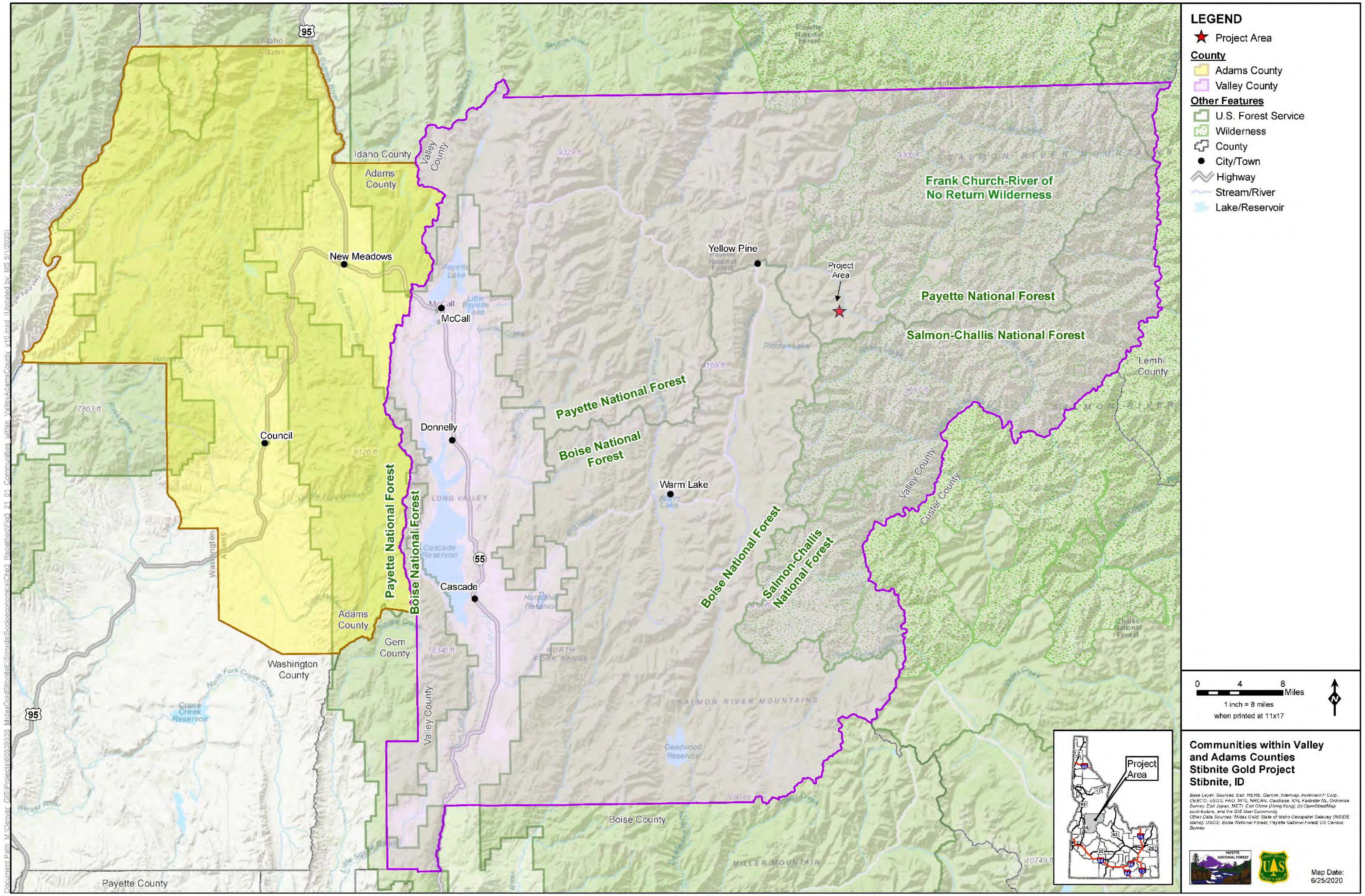

Figure Source: AECOM 2020

Figure 3.21-1 Communities within Valley and Adams Counties

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3.21.2.2 General Mining Act of 1872 (The 1872 Mining Law)

The 1872 Mining Law (30 United States Code, Chapter 2) and subsequent amendments established the statutory right to locate, develop, and extract mineral deposits on federal lands open to mineral entry. The U.S. Forest Service (Forest Service) regulates locatable mineral operations on the surface of the NFS lands under regulations codified at 36 Code of Federal Regulations 228A.

3.21.2.3 Mining and Mineral Policy Act of 1970

Through the Mining and Mineral Policy Act of 1970, Congress has stated that it is the continuing policy of the federal government, in the national interest, to foster and encourage private enterprise in:

- The development of economically sound and stable domestic mining, minerals, and metal and mineral reclamation industries; and
- The orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help ensure satisfaction of industrial, security, and environmental needs.

3.21.2.4 Valley County and Adams County Comprehensive Plans

Both the Valley County and Adams County comprehensive plans reaffirm the importance of natural resources to their communities' economies (Adams County 2006; Valley County 2018a).

The Valley County Comprehensive Plan includes the following goals and objectives pertinent to the SGP:

- *Natural Resources Goal 5: To assure mining remains a viable element in Valley County's economy.*
- *Economic Development Goal 1-Objective 2: Consider the long-term impacts and benefits on the local economy and environment of each proposed new commercial and industrial activity.*
- *Economic Development Goal 1-Objective 3: Maintain the important role of the timber industry, tourism, outdoor recreation, mining, and agriculture in the local economy.*

The Adams County Comprehensive Plan includes the following goal pertinent to the SGP:

- *Economic Goal 4: Provide an economically viable environment that builds and maintains a diverse base of business.*

3.21.3 Existing Conditions

The following section provides historic and current population and housing data, income and labor force trends, and government revenues based on the most recent data year available, as well as describes social conditions and public services in the analysis area.

3.21.3.1 Population and Housing

The U.S. Census Bureau's (Census') 2014-2018 American Community Survey was used to identify the population and housing characteristics of all the communities within the analysis area. American Community Survey data also was used to evaluate the three tribal communities located outside the analysis area with strong cultural associations and traditional use of the analysis area and surroundings.

American Community Survey data are generally "period" estimates that provide data collected and averaged over a period of time to represent a population's characteristics. As such, it can differ from "point-in-time" data estimates (e.g., the decennial census data) that represents the population's characteristics for a specific date). The primary rationale for using multi-year estimates in this analysis of population and housing is its greater statistical reliability for less populated areas and small population subgroups. Furthermore, 5-year estimates were used to evaluate the analysis area's communities, because 1-year estimates are only available for geographies with more than 65,000 people (Census 2018a).

Valley and Adams counties are both rural areas located in central Idaho with low population densities of less than three people per square mile. Valley County is Idaho's fifth largest county by area but is only the 28th most populated (year-round) of the state's 44 counties (Census 2010). Valley County experiences an influx of seasonal residents, recreationists, and vacationers during both the summer and winter months. Adams County is the 22nd largest county in Idaho by area and one of the state's least populated (year-round) counties (40th out of the state's 44 counties). **Table 3.21-1** shows the populations of both counties and Idaho State in 2010 and 2018.

Table 3.21-1 Valley County, Adams County, and Idaho Population Demographics

Year	Valley County	Adams County	Idaho
Population (2018)	10,401	4,019	1,687,809
Population (2010)	9,862	3,942	1,567,582
Percent of Population Change (2010 to 2018)	5.5%	1.9%	7.7%

Table Source: Census 2010, 2018b

As shown in **Table 3.21-1** and **Table 3.21-2**, Valley County's total population in 2018 was 10,401 (with a median age of 48.7), and Adams County had a total population of 4,019 (with a median age of 54.2) in 2018. By comparison, Idaho's corresponding total population was 1,687,809 with a median age of 36.1. Both Valley and Adams counties are rural counties with low population densities and a limited number of small towns/cities. Compared to the statewide population, both counties have a lower percentage of residents under 18 years old and a greater percentage of residents over 65 years old.

Table 3.21-2 Valley County, Adams County, and Idaho Population Density

Population Description	Valley County	Adams County	Idaho
Percent of population under 5 years old (2018)	4.7%	3.8%	6.8%
Percent of population under 18 years old (2018)	18.2%	18.3%	26.0%
Percent of population from 18 to 64 years old (2018)	58.2%	53.6%	59.0%
Percent of population 65 years and older (2018)	23.4%	28.1%	15.0%
Median age (2018)	48.7	54.2	36.1
Land area, in square miles (2010)	3,664	1,363	82,643
Persons per square mile (2010)	2.7	2.9	19.0

Table Source: Census 2010, 2018b

As shown in **Figure 3.21-1**, the communities closest to the SGP area include Council, New Meadows, McCall, Donnelly, Cascade, and Yellow Pine. The largest of these communities is McCall, with a 2018 population of 3,226, and Council, with a 2018 population of 872 (Census 2018b). Cascade had a population of 664, and New Meadows had a population of 501 in 2018. Yellow Pine and Donnelly are very small communities with only 32 and 58 residents in 2018, respectively (Census 2018b). Altogether, approximately half of Valley and Adams counties' total populations reside in these six communities.

During the 1990s and early 2000s, Valley County experienced considerable growth in new housing units. However, since the 2008 recession, new housing construction has been relatively limited. In 2010, Valley County had an estimated total of 11,789 housing units, which increased by only 439 additional housing units by 2018. As shown in **Table 3.21-3**, the majority of Valley County's housing inventory consists of vacation/seasonal second homes for out-of-county residents (Census 2010, 2018b). Of Valley County's 12,228 housing units in 2018, nearly 72 percent (8,767 units) were vacant. Most of these vacant units (8,423 units) were reported for seasonal, recreational, or occasional use (i.e., generally second homes) with only 225 non-seasonal vacant units for sale, rent or otherwise are vacant (Census 2018b).

Valley County's residential communities are well-established and very stable. Most residents own their homes, and over a quarter of whom have lived in their current place of residence for 20 years or more.

Table 3.21-3 Valley County, Adams County, and Idaho Housing Data (2010 and 2018)

Housing Data	Valley County	Adams County	Idaho
Housing units (2018)	12,228	2,683	711,731
Housing units (2010)	11,789	2,636	667,796
Occupied housing units (2018) Percent of total	3,461 28.3%	1,675 62.4%	618,331 86.9%
Vacant housing units (2018) Percent of total	8,767 71.7%	1,008 37.6%	93,400 13.1%
Vacant, for sale	104	34	7,621
Vacant, for rent	84	7	10,911
Sold or rented, not occupied	119	15	6,937
Vacant, Occasional use[1]	8,423	897	49,311
Other vacant[2]	37	55	17,836
Vacant, for migrant workers	0	0	784
Owner-Occupied Housing Units	78.7%	80.6%	69.3%
Renter-Occupied Housing Units	21.3%	19.4%	30.7%
Lived in the same house 1 year ago	97.2%	97.2%	94.5%
Lived in the same house for less than 3 years	11.8%	15.9%	19.2%
Lived in the same house for over 10 years	58.3%	65.4%	51.1%
Lived in the same house for over 20 years	26.6%	33.5%	22.3%
Lived in the same house for more than 30 years	9.3%	17.4%	10.2%
Average household size (2018)	3.02	2.24	2.73
Median value of owner-occupied housing units (2010)	$287,100	$205,100	$172,700
Median value of owner-occupied housing units (2018)	$283,000	$173,100	$192,300
Median rental rates of renter-occupied housing units (2010)	$727	$504	$689
Median rental rates of renter-occupied housing units (2018)	$760	$619	$825

Table Source: Census 2010, 2018b

Table Notes:

1 Occasional use is defined by the Census as vacant homes used for weekend or occasional use throughout the year and are generally second homes.

2 Other vacant is defined by the Census as year-round units which were vacant for reasons, such as foreclosures, held for settlement of an estate, held for personal reasons, or held for repairs.

Adams County had an estimated total of 2,636 housing units in 2010 and added only 47 new housing units by 2018. Of the 2,683 housing units in Adams County in 2018, 1,008 housing units (38 percent) were vacant, with most (897 units) being reported for seasonal, recreational, or occasional use, leaving 96 non-seasonal vacant homes for sale or rent (Census 2018b). Adams County's communities also are long established and stable; most residents own their homes, and over a third of whom have lived in their current place of residence for 20 years or more.

The data suggest much of the housing formerly available to permanent residents has been sold to second home buyers (increasing the number of occasional housing units and decreasing the availability of housing to local residents) (Highland Economics 2018). Many local residents perceive that local property prices have increased over the last decade. However, Census data on housing prices in Valley and Adams counties do not show an increase in sale price resulting from a relatively low availability of housing, as median owner-occupied housing prices for both counties have fluctuated but generally not risen since 2010 (Census 2018b; Highland Economics 2018). Valley County's median owner-occupied property value in 2018 ($283,000) was approximately 10 percent lower than its 2010 value of $287,100 (Census 2010, 2018b). Similarly, Adams County's 2018 median owner-occupied property value ($173,100) decreased by nearly 18 percent from its 2010 value of $205,100 (Census 2018b). However, in Idaho as a whole, owner-occupied property value increased 11 percent over the same time period ($172,700 to $192,300).

Conversely, median rental rates increased in Valley County by 4.5 percent ($727 in 2010 to $760 in 2018) and in Adams County by 22.8 percent ($504 in 2010 to $619 in 2018) (Census 2010, 2018b). Between 2010 and 2018, the percentage of Valley County households paying more than 30 percent of their household income on rent grew from 33.5 percent to 59.1 percent (Census 2010, 2018b). This increase indicates that the local housing market is becoming less affordable. However, the percentage of households paying more than 30 percent of their household income on rent decreased from approximately 50 percent to 39.9 percent in Adams County indicating that its local housing market has become slightly more affordable (Census 2010, 2018b).

As shown in **Table 3.21-3**, compared to Idaho, median rental rates in Valley and Adams counties were less than the State's median rental rate of $825 in 2018. In 2018, the median rental rate in Valley County was $760 and as a result was 7.9 percent less than the State's median rate, and the median rental rate in Adams County of $619 remained less than the State (25.0 percent less). The percentage of households in the State paying more than 30 percent of their household income on rent increased marginally by approximately 0.4 percent between 2010 (46.2 percent) and 2018 (46.4 percent) (Census 2010, 2018b).

3.21.3.2 Income and Labor

Valley County's economy is relatively strong with a 2019 unemployment rate of 3.8 percent which is slightly greater than the 3.3 percent Idaho statewide unemployment rate (Idaho Department of Labor 2020c). In 2018, 2.2 percent of Valley County residents lived in deep poverty, defined as earning an income that is half of the federal poverty level (Headwaters Economics 2020). Median household and per capita incomes in Valley County also were slightly higher than the statewide averages. The percentage of people not in the labor force in Valley County (50.5 percent) also was higher than the statewide average (37.6 percent) (**Table 3.21-4**).

Adams County has a comparatively weaker economy than neighboring Valley County, with a 2019 unemployment rate of 6.6 percent (Idaho Department of Labor 2020b). A greater proportion of Adams County's residents were in deep poverty (4.3 percent) compared to Valley County in 2018 (Headwaters Economics 2020). Median household and per capita incomes for Adams County were lower than the statewide average, while its unemployment rate was twice the statewide rate (**Table 3.21-4**).

Table 3.21-4 Valley County, Adams County, and Idaho Income (2018 Dollars)

Income Parameter	Valley County	Adams County	Idaho
Median Household Income (2018)	$55,299	$45,318	$53,089
Per Capita Income (2018)	$30,838	$25,143	$26,772
Percentage of People Below Poverty Level (2018)	10.0%	11.4%	13.8%
Percentage of Population 16 Years and Over – Unemployed (2018)	2.2%	5.6%	2.9%
Percentage of Population 16 Years and Over – Not in Labor Force (2018)	50.5%	49.6%	37.6%
Percentage of Population16 Years and Over – Unemployed (2019)	3.8	6.6	3.3

Table Source: Census 2018b; Idaho Department of Labor 2020b,c

Table Notes:

The U.S. Census American Community Survey provides the most recent 2018 data for both unemployment and population not in the labor force. The Idaho Department of Labor provides total umemployment for 2019; however, the Department does not provide data for the percentage of the population not in the labor force.

The Idaho Department of Labor collects data on current employment by industry in each county and projects employment growth by economic region over a 10-year period (2016-2026). Both Valley and Adams counties are identified by the Idaho Department of Labor as part of the Southwestern Region. Future employment growth in the region's professional and business services (e.g., trade, utilities, and transportation), as well as educational and health services sectors are expected to substantially increase by 2026. No employment growth from other new major mining operations in the region's mining and manufacturing sector over the 10-year period was forecasted (Idaho Department of Labor 2019).

Valley County was majorly affected by the 2008 recession, but in recent years its economy has subsequently recovered. Historically, Valley County's economy was dependent on timber extraction, but the county's last major mill closed in 2001, and the resulting loss of 70 jobs has continued to impact the area (IDEQ 2019). Today, tourism is a primary driver of the Valley County economy. As shown in **Table 3.21-5**, in 2018, the tourism-related (e.g., leisure and hospitality) sector and the governement sector provided the most Valley County jobs, while the mining and information services sectors employed the fewest workers (Idaho Department of Labor 2020b). Currently, Valley County's highest paying jobs are in mining followed by information services, government, and education/health service sectors, while the lowest paying jobs include leisure and hospitality and other services (Idaho Department of Labor 2020b).

Adams County's economy has recovered more slowly since the 2008 recession but has benefited from an increase in retirees relocating to the area. During that period the county's unemployment rate decreased significantly from its 2010 rate of 18.5 percent to 6.6 percent in 2019 (Idaho Department of Labor 2020c). As shown in **Table 3.21-5**, in 2018, the government sector jobs accounted for the largest share (31 percent) of Adams County employment. The County's other major employment sectors are manufacturing and the trade, utilities, and transportation sectors which each account for approximately 15.5 percent of county's jobs. Like Valley County, the information services sector employed the fewest number of workers in Adams County (Idaho Department of Labor 2020c), with the caveat that no workers were employed in the mining sector. The information sector provides Adams County's highest paying jobs, while the tourism-industry (i.e., leisure and hospitality sector) has the lowest paying jobs (Idaho Department of Labor 2020c).

Table 3.21-5 Employment and Wages by Industry in Valley and Adams County (2018 Dollars)

Labor Sector	Valley County Employment	Valley County Wages per Employee	Adams County Employment	Adams County Wages per Employee
Total covered wages	4,751	$36,134	1,026	$37,468
Agriculture	53	$34,550	60	$45,886
Mining	38	$79,834	0	$0
Construction	506	$39,106	66	$36,587
Manufacturing	44	$33,686	157	$42,044
Trade, utilities, and transportation	755	$32,179	162	$32,595
Information services	58	$66,747	12	$94,832
Financial	207	$41,409	23	$48,704
Professional and business services	183	$37,504	50	$34,355
Educational and health services	457	$51,758	68	$38,919
Leisure and hospitality	1,382	$21,864	95	$13,244
Other services	111	$21,507	16	$26,724
Government	957	$46,808	318	$41,256

Table Source: Idaho Department of Labor 2020b,c

Table 3.21-6 shows the average commute times for both Valley County and Adams County residents, as well as the statewide average. Over three quarters of Valley County workers commute less than 20 minutes to work. However, Adams County residents generally have much longer average commutes than Valley County or the state. Less than 20 percent of Adams County workers commute more than 45 minutes to work – a proportion that is just less twice the statewide rate.

Table 3.21-6 Travel Time to Work for Valley County, Adams County, and Idaho

Travel Time to Work	Valley County	Adams County	Idaho
Less than 20 Minutes	79.9%	38.1%	56.4%
20-45 Minutes	14.9%	43.6%	34.3%
More than 45 Minutes	5.2%	18.3%	9.3%

Table Source: Census 2018b

3.21.3.2.1 U.S. FOREST SERVICE INCOME AND LABOR

The Forest Service supports local economies within the analysis area through recreation, timber, energy, minerals, and livestock grazing. In addition, counties with national forests receive funds to support schools, road maintenance, and stewardship projects. The Forest Service also contributes through its construction and maintenance of infrastructure, environmental restoration, and forest health management activities.

In 2016, Forest Service's management and stewardship activities for the Payette National Forest (PNF) supported approximately 2,010 local jobs and $73.2 million in local labor income (Forest Service 2016a). The agency's activities for the Boise National Forest (BNF) supported approximately 2,580 local jobs and $113.0 million in local labor income in 2016 (Forest Service 2016b).

3.21.3.3 Social Conditions

The central Idaho region provides residents and visitors a natural and rural setting with a remote character, outdoor recreation opportunities, natural beauty, and scenic quality of public lands. Many area residents value these characteristics as important factors contributing to their personal quality of life and sense of place. The "sense of place" experienced and valued by central Idaho communities is based on the region's remote and rural setting, natural and undeveloped landscape, along with diversity in topography and vegetation, presence of cultural and traditional uses (e.g., open rangelands), and historical landscape. "Sense of place," can be described as an unquantifiable value that attracts people to specific locations, generates a community identity, and ultimately contributes to the overall quality of life for residents (Williams 2014). These characteristics are often primary factors that attract and retain many residents in these communities.

In addition, many of these communities have mixed cash-subsistence economies, providing both wage-based employment and subsistence lifestyle opportunities, which contribute to residents' quality of life and sense of place. Some of the cultural attributes of this traditional value structure include appreciation of open space and rural living, access to undeveloped and scenic land for recreational uses (e.g., hunting and fishing), and maintenance of traditional rural and public lands as well as natural landscapes.

Valley County has a history of mining dating back over 100 years since the Thunder Mountain gold rush in the early 1900s. The Thunder Mountain mining boom was short lived, as initial reports of the gold deposits were highly exaggerated. However, years later mining resumed in the area with substantial mining occurring in the Stibnite-Yellow Pine Mining District in the 1920s to 1950s, when over 1,500 people resided at Stibnite and at the nearby Cinnabar mine. Mining resumed in the 1980s at Stibnite, with two active operations within the district. Work continued intermittently until 1997 under several different mining companies. Mining work did not occur again until 2009 when affiliates of Midas Gold Idaho, Inc. (Midas Gold) began exploration work in the Hangar Flats area. See Section 3.17.3.1.3, Contact or Historic Period, in Section 3.17, Cultural Resources, for a detailed discussion of the Stibnite-Yellow Pine Mining District history.

Valley County also has a history of timber extraction. However, the last large lumber mill in Valley County was closed in 2001, resulting in a loss of approximately 70 jobs (Idaho Department of Labor 2020b). Over the past couple of decades, Valley County has developed its tourism sector as an important economic driver.

Adams County remains more dependent on natural resources, including farming, ranching, and the timber industry (which includes logging) (Idaho Department of Labor 2020b,c). Lumber mills employed approximately 150 people, and logging employed approximately 40 people (Idaho Department of Labor 2020c). There are currently no active metal mines operating in Adams County (Idaho Department of Labor 2020c).

Both Valley and Adams counties include large areas of federally administered lands. These federally managed lands, as well as the private lands surrounding them, are prized for their remoteness and natural beauty. In recent years, both counties have attracted new residents from recreationists and retirees looking for small towns, natural beauty, and wide-open areas and landscapes.

3.21.3.3.1 NATIVE AMERICAN TRIBES

Traditional Native American land use occurs throughout the analysis area. Regional tribes exercise their rights for off-reservation fishing, hunting, and gathering on PNF and BNF lands. These land uses are protected through the U.S. Constitution, treaties, executive orders, statutes, and court decisions. These rights enable tribes to access all traditional hunting, fishing, and gathering locations, which have important cultural and religious significance for the tribes.

The analysis area is within the traditional subsistence range for the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes. The tribes have a long association and history of use of the region for both cultural and subsistence purposes. All the tribes also currently continue to use these lands for hunting, fishing, foraging, and communing. Consequently, tribal access and use of the region has long-standing and ongoing current cultural importance and subsistence value for tribal members.

The area’s waterways and native anadromous and other resident fish populations have had long-standing cultural significance to the Nez Perce Tribe, including subsistence, ceremonial and spiritual, medicinal, economic or commercial, and intrinsic value (EPA 2016).

As discussed in Section 3.24, Tribal Rights and Interests, limited information received from the Nez Perce Tribe and Shoshone-Paiute Tribes' ethnographies indicate that areas, resources, and off-reservation rights of concern and importance include fishing rights in the South Fork of the Salmon River watershed, including the East Fork South Fork Salmon River, Meadow Creek, Fiddle Creek, West End Creek, and Sugar Creek. Other landscape features of importance include Riordan Lake and high points in the landscape (e.g., mountain tops and ridgelines) that may be used for spiritual practice, and traditional plant gathering locations or collection areas.

The Shoshone-Bannock Tribes have begun their ethnographic work, but it is not yet completed. Refer to Section 3.24, Tribal Rights and Interests, for additional information regarding the tribes and treaties, traditional practices, tribal world view, traditional cultural properties, sacred sites, and traditional resource collection areas in the analysis area.

The socioeconomic conditions of each of these tribes are discussed below based on the most current data available at the time of writing. **Figure 3.21-2** shows the location of these tribe's primary communities and the SGP analysis area. However, significant populations of tribal members also live outside those communities elsewhere within the region that also could be affected by the SGP.

3.21.3.3.1.1 Nez Perce Tribe

The Nez Perce Tribe was historically a nomadic tribe that travelled the territory of what is now Idaho, Oregon, Washington, and Montana. The Nez Perce Reservation encompasses portions of Nez Perce, Clearwater, Lewis, and Idaho counties in Idaho. Nez Perce CCD is a Census recognized subdivision within the Reservation that includes the community of Lapwai, which is the seat of the Nez Perce Tribal government and has the highest proportion of tribal members as residents. In addition, the Tribal headquarters, school, and casino also are located in the Nez Perce CCD. Therefore, the Nez Perce CCD was selected to represent the population of the Nez Perce Tribe for the social and economic conditions analysis.

Based on available Census data for the Nez Perce Census CCD, the Nez Perce Tribe's largest economic sector is educational and health care services, which employs 25 percent of the local workforce (Census 2018b). Public administration employs 13 percent of the local workforce, while its natural resources sector (e.g., agriculture, forestry, fishing, hunting, and mining) and recreation and service sector (e.g., arts, entertainment, recreation, accommodation, and food services) each provide around 11 percent and 8 percent of residents' jobs, respectively (Census 2018b). Important tribal businesses include its fish hatchery operations and casino. Other tribal enterprises include a convenience store, recreational vehicle park, and forestry products company (Nez Perce Tribe 2006).

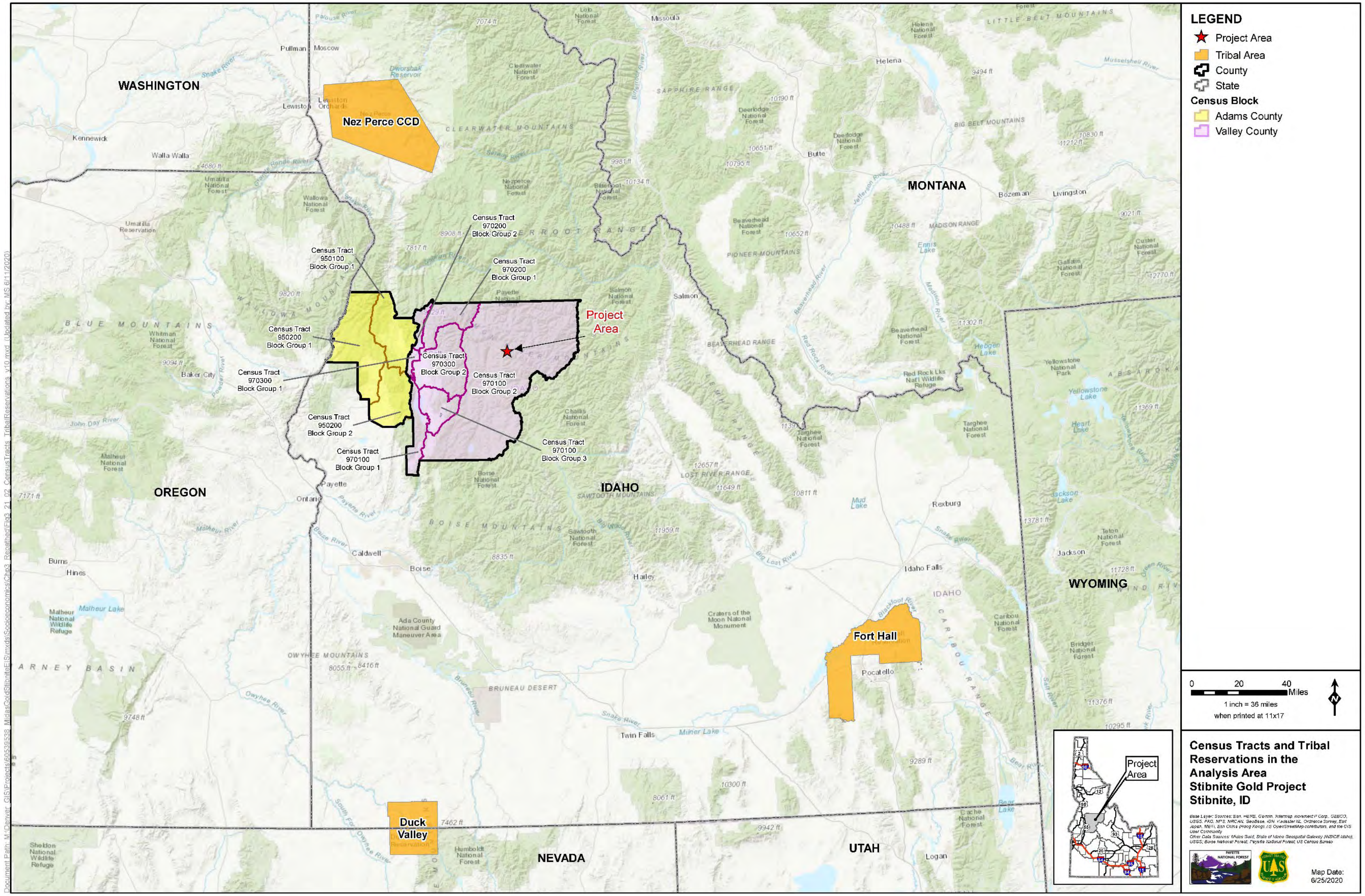

Figure Source: AECOM 2020

Figure 3.21-2 Census Tracts and Tribal Reservations in the Analysis Area

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3.21.3.3.1.2 Shoshone-Bannock Tribes of the Fort Hall Reservation

The Shoshone-Bannock Tribes of the Fort Hall Reservation are composed of the eastern and western bands of the Northern Shoshone and the Bannock bands. Both tribes historically occupied vast regions of what is now Idaho, Oregon, Nevada, Utah, Wyoming, Montana, and areas of Canada.

Traditionally, they hunted wild game, fished primarily for salmon, and collected native plants and roots (Shoshone-Bannock Tribes 2015). The Fort Hall Reservation is in southeast Idaho. Fort Hall Reservation’s largest source of employment is the recreation and service sector (e.g., arts, entertainment, recreation, accommodation, and food services), which employs 21 percent of the local workforce (Census 2018b). The reservation’s education, health care, and public administration sectors provide jobs for another 16 percent of the local workforce (Census 2018b). The Tribe also operates a casino, hotel, and the Famous Potatoes farming businesses.

3.21.3.3.1.3 Shoshone-Paiute Tribes of the Duck Valley Reservation

The Shoshone-Paiute Tribes of the Duck Valley Reservation historically occupied what is now Idaho, Nevada, and Oregon. In 1934, the Shoshone and Paiute united and formed a Tribal government at the Duck Valley Reservation in southern Idaho/northern Nevada (Shoshone-Paiute Tribes 2017). The Duck Valley Reservation’s largest economic sectors are public administration, which employs 41 percent of the local workforce, and educational and health care services, which provides jobs for another 32 percent of the workforce (Census 2018b). The Tribe manages three trout fisheries, several camping areas, a solid waste transfer station, and a recycling center.

3.21.3.4 Public Services

Valley and Adams counties, along with their municipalities, provide police, fire, utilities, schools, and libraries for residents and workers. Because new residents relocating to the region for work at the SGP could result in population growth that would generate greater demand for public services in the local area, the following sections focus on the communities within the analysis area where any SGP-related population growth would likely occur. For a discussion of hospitals and medical facilities please see Section 3.18.3.3.5, Public Health and Safety, Emergency Medical Services and Fire Protection.

3.21.3.4.1 POLICE

Police services are provided by the Valley County Sheriff’s Department, the Adams County Sheriff’s Department, the Idaho State Police, and the McCall City Police. The Valley County Sheriff’s Department patrols the unincorporated portions of Valley County in the analysis area and the communities of Donnelly and Cascade. The Adams County Sheriff’s Department provides police services for New Meadows and Council.

McCall has its own local police department, which cooperates with the Valley County Sheriff’s Department, the Idaho State Police, and other agencies including the Forest Service and the Idaho Department of Fish and Game.

Reported crime in Valley County decreased slightly between 2014 (283 reported incidents) and 2018 (279 reported incidents), which represented a decrease in crime by 1.4 percent over the 5-year period (Idaho State Police 2018). During that same period, reported crime in Adams County increased from 113 to 232 reported incidents, which represented a 51 percent increase over the 5-year period (Idaho State Police 2018). In both Valley and Adams counties, most of these offenses consisted of drug/narcotic violations (Idaho State Police 2018).

Forest Service Uniformed Law Enforcement Officers and Forest Protection Officers provide year-round enforcement of federal laws governing the National Forests. In addition, the Forest Service contracts with the Valley County Sheriff's Department to patrol National Forest areas from May through September. The U.S. Bureau of Reclamation also contracts Valley County to patrol their lands, campgrounds, and waterways over the same summer period.

3.21.3.4.2 FIRE PROTECTION

There are four major structural fire-fighting agencies and districts in Valley County serving the communities of Cascade, Donnelly, McCall, and Yellow Pine, and their surrounding rural areas. There also are two small fire-fighting agencies in Adams County that serve New Meadows and Council. These fire-fighting agencies provide 24-hour fire protection for businesses and residents in their service areas and are mostly staffed by volunteers (**Table 3.21-7**). All the fire-fighting districts within Valley County, PNF, BNF, and Valley County comprise the Valley County Fire Working Group Collaborative (Wildfire Prevention Associates 2018). This group is responsible for the continued update of the Valley County Wildfire Protection Plan. The Valley County Fire Working Group Collaborative emphasizes prevention of wildland urban interface fires using a proactive, cooperative approach; ensures that the land development ordinances and building codes in Valley County support mitigation of wildland urban interface fire danger; and promotes effective fuel reduction programs in all wildland urban interface areas in Valley County (Wildfire Prevention Associates 2018).

Table 3.21-7 Fire Protection for Communities in the Analysis Area

Station Details	Cascade Rural Fire Protection District	Donnelly Rural Fire Department	McCall Fire Protection District	Yellow Pine Fire District	Meadows Valley Fire District	Council Valley Fire Department
Number of Stations	4	1	1	1	1	1
Full-time paid fire fighters	3	2	4	0	0	0
Part-time paid fire fighters	0	0	25	1	0	0
Volunteer fire fighters	36	26	0	10	15	16
Non-firefighting paid staff	0	0	3	0	0	4
Non-firefighting volunteer staff	0	0	12	0	4	0

Table Source: Midas Gold 2017

3.21.3.4.3 UTILITIES

In Valley County the communities of Cascade, Donnelly, McCall, and Yellow Pine each operate their own community water and sewer systems. In addition, there are several condominium complexes, subdivisions, and church camps with central water systems and a few subdivisions that have central sewer systems. Some outlying areas have formed districts (such as the Northlake Recreational Sewer and Water District), but most of Valley County's rural homes rely on individual water wells and septic systems.

In Adams County, New Meadows and the county operate their own water and sewer systems. Both Adams and Valley counties contract with Lakeshore Disposal for trash hauling services and operation of two materials recovery facilities located in New Meadows and Donnelly. These facilities serve as transfer stations, and the collected solid waste is hauled for processing and disposal at recycling centers and landfills outside the county. Residents can haul their own refuse to the materials recovery facilities for a nominal dumping and processing fee. Residents also can drop off recyclables in New Meadows, Council, McCall, Cascade, and Donnelly.

Utilities and communications are readily available to Valley County and Adams County residents. Idaho Power Company provides electric service to the region. Natural gas is not available in the area; therefore, homes are heated with electricity, propane, fuel oil, wood and/or pellets.

3.21.3.4.4 EDUCATION

Valley County has a slightly higher percentage of individuals with a high school degree or higher (94 percent) than the state average of 90.2 percent. Approximately 32 percent of Valley County residents have a bachelor's degree or higher (Census 2018b). Valley County has two public school systems: McCall/Donnelly School District No. 421 (which includes Yellow Pine) and Cascade School District No. 422.

McCall/Donnelly School District No. 421 serves the northern part of Valley County and includes the following schools:

- Donnelly Elementary School in Donnelly
- Barbara R. Morgan Elementary School in McCall
- Payette Lakes Middle School in McCall
- McCall/Donnelly High School in McCall
- Heartland High School in McCall.

Table 3.21-8 shows each school's past and 2019 enrollment.

Table 3.21-8 Enrollment for McCall/Donnelly School District No. 421

School Name	2000 Enrollment	2010 Enrollment	2019 Enrollment
Donnelly Elementary	106	121	166
Barbara R. Morgan Elementary	301	299	413
Payette Lakes Middle School	235	218	314
McCall/Donnelly High School	359	275	338
Heartland High School	22	17	34
District Total	1,023	930	1,265

Table Source: Idaho Schools 2020a; Midas Gold 2017

Cascade School District No. 422 provides kindergarten through high school education for southern Valley County residents at its single facility, the Cascade School. In 2000, the Cascade School's enrollment was 310 students, which fell to 293 students in 2010 and to 192 students in 2019 (Idaho Department of Education 2020a).

Several private and public schools in Valley County also provide other education options. North Fork School and Crestline Academy are both private schools located in McCall. North Fork School, which had approximately 19 students during the 2019-2020 school year, provides third through 12th grade education and most North Fork School students are dually-enrolled in the McCall-Donnelly public schools (North Fork School 2020). Crestline Academy provides kindergarten through 12th grade education. The University of Idaho Cooperative Extension Office, located in Cascade, administers the local 4-H program, which provides continuing education for adults.

The Western Idaho Community Action Partnership, Inc., a private non-profit organization, administers the Head Start Program in Donnelly. The program provides early childhood education programs for 3- and 4-year-old children from low income households, and for disabled children.

Adams County has a slightly lower percentage of individuals with a high school degree or higher (89 percent), which is comparable to the state average of 90.2 percent (Census 2018b). Adams County has public schools in New Meadows and Council. Meadows Valley School provides pre-kindergarten through high school education with a 2019 enrollment of 153 students (Idaho Department of Education 2020b). The Council Elementary School provides pre-kindergarten through sixth grade education with a 2019 enrollment of 148 students (Idaho Department of Education 2020c). The Council Junior-Senior High School provides seventh grade through 12th grade education and enrolled 111 students in 2019 (Idaho Department of Education 2020c). Between 2010 and 2019, Meadows Valley School District's student enrollment decreased by 22 percent, while enrollment in the Council School District increased by 14 percent (Idaho Department of Education 2020b,c).

3.21.3.4.5 LIBRARIES

Valley County has three public libraries located in McCall, Donnelly, and Cascade. The Donnelly Library is funded through the Donnelly Public Library District, while the McCall and Cascade libraries are funded by city taxes. Adams County has libraries in New Meadows and Council. These libraries are funded by city taxes, but residents outside the city limits can pay membership dues to obtain library service privileges. In addition to their lending services, the libraries provide public access to the Internet, fax and copy services, medical journals, legal materials, videos, audio books, periodicals, inter-library loan services, backcountry services, outreach programs, reading programs, and research assistance. There also is a law library at the Valley County Courthouse in Cascade, which is open to the public.

3.21.3.5 Recreation Use

Recreation users in the analysis area are mostly locals, originating from areas such as Yellow Pine, Warm Lake, and Big Creek/Edwardsburg, and areas just west of the analysis area including Cascade and Long Valley (Forest Service 2010). Users particularly in the western portion of the analysis area also are from populated areas further south including Treasure Valley and Boise (Forest Service 2010). As noted in the Payette Forest Plan for PNF Management Area 13, though most use is local, “users come through the area from all over the country to use the adjacent Wilderness (Frank Church River of No Return Wilderness), especially during big-game hunting seasons” (Forest Service 2003).

Recreation use occurs throughout NFS, state, and private lands in the analysis area. Developed recreation use is limited to the developed recreation sites (i.e., overnight facilities) located primarily in the Warm Lake, Landmark, and Johnson Creek Road areas. Most recreation in the analysis area is year-round dispersed use, such as hunting, fishing, hiking, backpacking, and all-terrain vehicle use, which occurs outside of these developed recreation sites. General visitation estimates are provided as part of the National Visitor Use Monitoring Program.[2] In 2018, approximately 519,000 people visited the PNF (Forest Service 2020). In 2014, approximately 756,000 people visited the BNF (Forest Service 2020).[3]

Based on estimates from the National Visitor Use Monitoring data, undeveloped areas received over 50 percent of the estimated visits in in the PNF and just under 50 percent in the BNF (see **Table 3.19-2** in Section 3.19, Recreation). Developed area use was higher in both forests at developed day use sites than at developed overnight sites. Use at developed day use areas was about 32 percent of visits for PNF and 37 percent of visits at BNF compared to overnight use, which was only about 5 percent of visits for PNF and 12 percent of visits for BNF. There were no wilderness visits estimated at BNF. However at PNF, wilderness use accounted for

[2] A site visit is the entry of one person onto a National Forest site or area to participate in recreation activities for an unspecified period of time.

[3] Although there are general visitation estimates available for the PNF (Fiscal Year 2018) and BNF (Fiscal Year 2014) as part of the National Visitor Use Monitoring Program, visitor use estimates are not available for specific management areas in the PNF or BNF in the analysis area.

about 1 percent of total visits. Overall, the BNF was estimated to receive over 45 percent more visits than the PNF.

In 2019, there were several recreation-related special use permits issued by the Forest Service within the analysis area: three lodges, one bicycle event, four outfitters and guides, two organizational camps, and 62 recreation residences. Permits issued for the PNF include a lodge, biking event, and three outfitters and guides while permits issued for the BNF include one outfitter and guide, two lodges, two organizational camps, and 62 recreation residences. All but one of the recreation-related special use permits issued for the BNF are in the Warm Lake area. **Table N-5** in **Appendix N** describes each of the current recreation-related special use permits that have been issued within the analysis area.

3.21.3.6 Government Revenues

Valley County and Adams County residents and businesses pay federal, state, and local income taxes. Household and business purchases generate sales taxes, and the structures owned by individuals and businesses in the area are subject to city and/or county property taxes. There also are product taxes and/or fees on many items, including beer, wine, cigarettes, motor fuels, motor vehicle licensing fees, regulatory taxes, and business ownership.

Net state general fund revenue collections in Idaho totaled $3.355 billion in fiscal year 2017 and $3.735 billion in fiscal year 2019, resulting in a 11.3 percent increase from fiscal years 2017 to 2019 (**Table 3.21-9**). Idaho has no state gift or inheritance taxes, and its estate tax expired in 2004.

Table 3.21-9 Idaho Tax Revenues for Fiscal Years 2017 and 2019

Type of Taxation	Fiscal Year 2017 Revenue ($M)	Fiscal Year 2019 Revenue ($M)	Percent Change (2017 to 2019)
Personal Income/Property	$1,590.9	$1,661.1	4.8%
Corporate Income/Property	$202.5	$283.2	39.8%
State Sales	$1,379.7	$1,597.7	15.7%
Product	$56.9	$64.3	13.0%
Mine License Fees	$0.05	$0.02	-60.0%
Other Miscellaneous	$124.2	$128.3	3.3%
Total Revenues	$3,354.5	$3,734.6	11.3%

Table Source: Idaho Division of Fiscal Management 2020; Midas Gold 2017

Table Notes:

M = million.

Revenues for funding county services are obtained from a variety of sources, including local sales and use taxes, local property taxes, Idaho general funds, Idaho Lottery funds, and Idaho highway users' funds. Schools in Valley and Adams counties also receive federal funding under the Secure Rural Schools program.

Valley County had a 2018 budget of $25.1 million, which included $7.5 million in property taxes, $3.8 million in intergovernmental revenues and $1.5 million in grants funding (Valley County 2018b) among other sources. Adams County had a 2018 budget of $8.9 million, which included $2.4 million in taxes, $0.3 million in grants, and $2.2 million in state funding (Adams County 2018) among other sources.

Neither Valley County nor Adams County has a separate sales tax. However, the cities of Donnelly and McCall impose an additional 1 percent local sales tax in addition to Idaho's 6 percent state sales tax. Both counties collect property taxes from lands and structures owned by individuals and businesses. These collected property taxes fund county government operations and local school systems.

Both counties have a high percentage of federal lands, which limits their potential tax base. In 2017, Valley County received approximately $2.6 million in federal land payments for the 2,046,000 acres (or 88 percent) of federally managed Valley County land (Midas Gold 2017). The federal land payments consisted of approximately $1.8 million in Forest Service Revenue Sharing and $0.8 million Payment In Lieu of Taxes disbursements. Approximately $2.0 million of these federal land payments were distributed to the County government and comprised 8 percent of the Valley County budget (Headwaters Economics 2019a; Valley County 2018b). Local school districts received approximately $0.5 million of these federal land payments with the remainder distributed to the region's Resource Advisory Committee.

Federally managed land accounts for approximately 68 percent of Adams County's land base. In 2017, Adams County received approximately $0.9 million in federal land payments consisting of approximately $0.7 million in Forest Service Revenue Sharing and $0.2 million in Payment In Lieu of Taxes disbursements. Approximately $0.7 million in federal land payments were distributed to the county government and $0.2 million was distributed to local school districts. Federal land payments comprised 7 percent of the Adams County budget (Adams County 2018; Headwaters Economics 2019b).

Mining and mineral sales in Idaho result in property taxes and mining licensing fees for both the state and counties. In addition, mineral extraction from public lands also can generate lease and royalty payments for the government. In 2012, the State of Idaho and its local governments received mining operations contributions of approximately $6.0 million in local property taxes and $7.0 million in state royalties, rents, and license fees (Idaho Mining Association 2013).

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3.22 ENVIRONMENTAL JUSTICE

3.22.1 Introduction and Scope of Analysis

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice is considered during the National Environmental Policy Act process to determine whether any disproportionately high and adverse human health or environmental effects to low-income, minority, and tribal populations may occur as a result of the federal action, in accordance with Executive Order 12898.

The analysis area for environmental justice consists of the communities and populations that would potentially be adversely affected (either directly or indirectly) by the Stibnite Gold Project (SGP). The communities identified with the potential to be affected by the SGP comprise all of Valley County and Adams County and are represented by the 2017 U.S. Census Bureau (Census) tracts shown on **Figure 3.22-1**. In addition, the environmental justice analysis area includes Native American Tribes whose traditional subsistence range includes the proposed mine site (i.e., the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes) to determine the extent that tribal members would experience adverse health or environmental effects as a result of the SGP. These communities are located more than 100 miles from the analysis area. However, tribal members may have long-established cultural, ceremonial, and subsistence use relationships with the wilderness areas in and around the analysis area and surrounding public lands. These tribal communities are shown on **Figure 3.22-1** and are represented by the portion of the Nez Perce Reservation described below, the Fort Hall Reservation (reservation of the Shoshone-Bannock Tribes), and the Duck Valley Reservation (reservation of the Shoshone-Paiute Tribes) where the SGP may affect a cultural, historical, or protected resource of value to a Native American Tribe or a minority population. The Nez Perce Reservation encompasses portions of Nez Perce, Clearwater, Lewis, and Idaho counties in Idaho. Nez Perce Census County Subdivision (CCD) is a census-recognized subdivision within the Reservation that includes the community of Lapwai, which is the seat of the Nez Perce tribal government and has the highest proportion of tribal members as residents. In addition, the tribal headquarters, school, and casino are in the Nez Perce CCD.[1] Therefore, the Nez Perce CCD was selected to represent the population of the Nez Perce Tribe for the environmental justice analysis.

[1] Census county subdivisions and equivalent entities are statistical geographic entities established cooperatively by the Census Bureau and officials of state and local governments in 21 states where minor civil divisions either do not exist or have been unsatisfactory for reporting statistical data.

3.22.2 Relevant Laws, Regulations, Policies, and Plans

3.22.2.1 Executive Order 12898

Executive Order 12898 requires federal agencies to “identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations” (Executive Office of the President 1994).

According to the Council on Environmental Quality’s environmental justice guidelines for the National Environmental Policy Act (Council on Environmental Quality 1997):

> “Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census’ Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals, where either type of group experiences common conditions of environmental exposure or effect.
>
> Minority populations should be identified where either: a) the minority population of the affected area exceeds 50 percent, or b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis…a minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above stated thresholds.”

3.22.2.2 National Forest Land and Resource Management Plans

Physical, social, and biological resources on National Forest System lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on National Forest System land.

In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010) provide management prescriptions designed to realize goals for achieving desired condition for environmental justice and include various objectives, guidelines, and standards for this purpose.

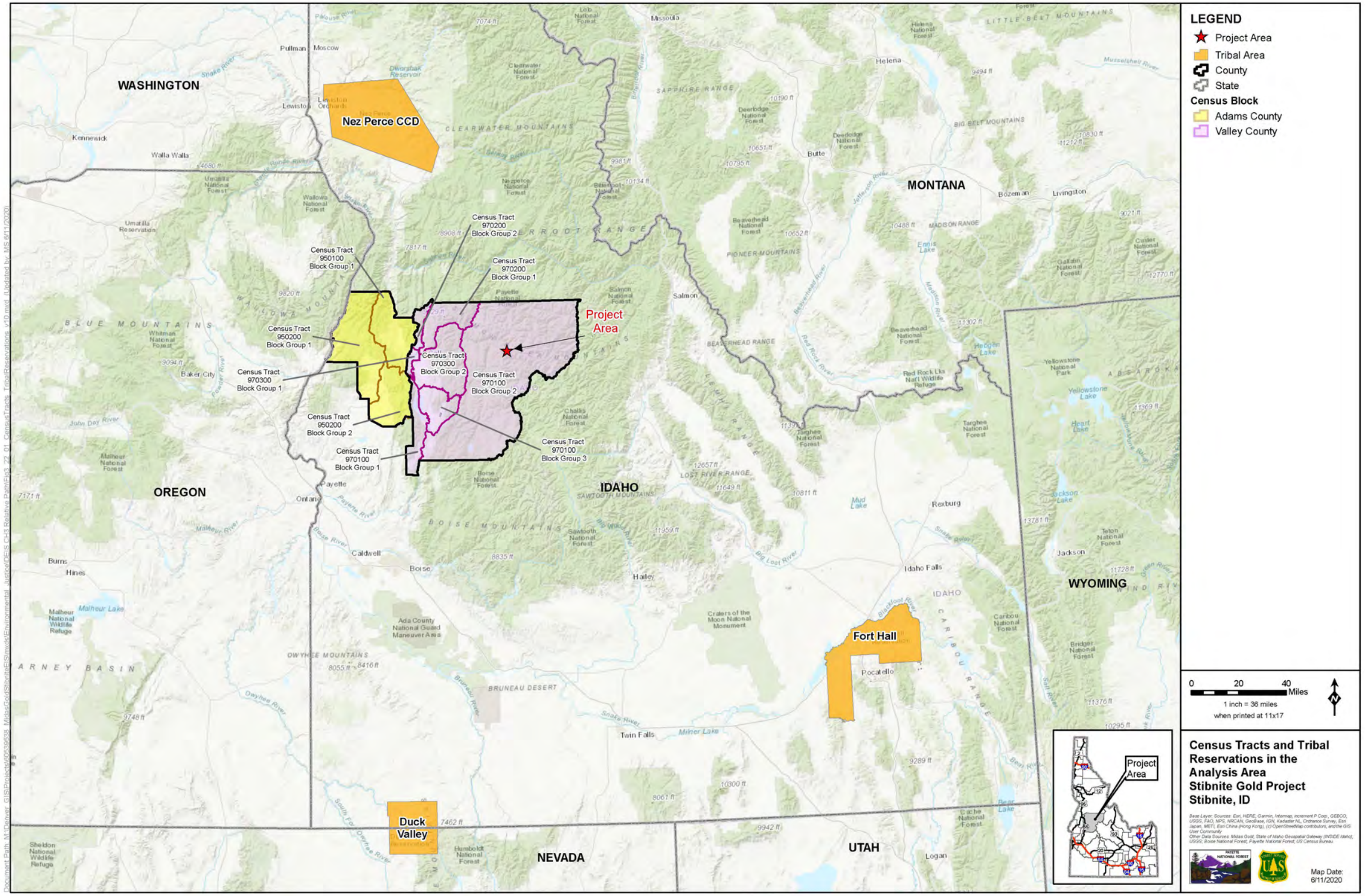

Figure Source: AECOM 2020

Figure 3.22-1 Census Tracts and Tribal Reservations in the Analysis Area

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3.22.3 Minority and Low-Income Environmental Justice Populations

3.22.3.1 Minority Environmental Justice Populations

The federal definition of a minority environmental justice community requires that the minority population (or total of all minority groups) of that community (at the Census block group, CCD, or reservation level for this analysis) either: 1) exceeds 50 percent of the total population of the community; or 2) is meaningfully greater than the general population (Council on Environmental Quality 1997; U.S. Environmental Protection Agency 2016).

Minority status is composed of both race and ethnicity. Minority races include American Indian or Alaskan Native, Asian or Pacific Islander, or African American. Minority ethnicity includes Hispanic origin (Council on Environmental Quality 1997). Race and ethnicity are not mutually exclusive; therefore, individuals who identify as Hispanic origin can be of any race. As a result, the white only (non-Hispanic) population represents the only non-minority population.

For this analysis, the state of Idaho was used to represent the general population and “meaningfully greater” was defined as 5 percentage points or more. This threshold was selected consistent with United States Forest Service (Forest Service) guidance as a reasonable and frequently used measure providing a more inclusive identification of minority communities of concern for environmental justice analysis (Forest Service 2014). As a result, given the total minority population statewide of 17.4 percent, a community with a total minority population of 22.4 percent or more would meet the definition under the second criteria despite the fact that its minority population is less than 50 percent of the community’s total population.

3.22.3.2 Low-Income Environmental Justice Populations

For a community to meet the federal definition of an environmental justice community for its low-income status, the percentage of people with an income below the Federal Poverty Level in the Census block group, CCD, or reservation for this analysis would need to be meaningfully greater than the statewide average.

Neither Executive Order 12898 nor the U.S. Department of Agriculture Department Regulation on Environmental Justice provide any specific criteria for determining the poverty level threshold necessary for meeting the definition of an environmental justice community (Executive Office of the President 1994; U.S. Department of Agriculture 1997). The U.S. Environmental Protection Agency guidance criteria suggest identification and analysis of low-income populations can be accomplished by selecting and disclosing the appropriate poverty thresholds as defined by the Census, the poverty guidelines as defined by the Department of Health and Human Services, or other appropriate sources, and identifying an appropriate geographic unit of analysis for identifying low-income populations in the affected environment (U.S. Environmental Protection Agency 2016).

Therefore, this analysis considered a Census block group, CCD, or reservation to meet the definition of low income if the percentage of people in the Census block group whose income was below the federal poverty level was 5 percentage points higher than for the state. This threshold was selected consistent with Forest Service guidance as a reasonable and frequently used measure providing a more inclusive identification of low-income communities of concern for environmental justice analysis (Forest Service 2014). Data for this analysis were derived from the U.S. Census Bureau's 2013-2017 American Community Survey, which is the most recent data available at the Census block group level at the time of this publication. As a frame of reference, the federal poverty level in 2017 was $24,858 for a family of four (Census 2018a).

3.22.4 Existing Conditions

As discussed in Section 3.21.3.3, Social Conditions, many of the local communities have mixed cash-subsistence economies that provide wage-based employment opportunities, as well as opportunities for a subsistence lifestyle that also contribute to residents' quality of life and sense of place. As a result, there could be SGP-related cultural and/or socioeconomic impacts on the tribal populations that have traditional hunting, gathering, and fishing rights to lands at or near SGP-related components. The discussed Native American populations live throughout Idaho, Washington, Oregon, and Nevada. The Nez Perce Reservation's major tribal population lives in the towns of Lapwai and Kamiah, Idaho. Kamiah also is recognized as a community that could potentially experience SGP-related socioeconomic impacts. The Shoshone-Bannock Tribes on the Fort Hall Reservation and Shoshone-Paiute Tribes on the Duck Valley Reservation are other Native American communities that could potentially experience SGP-related socioeconomic impacts.

3.22.4.1 Environmental Justice Communities in the Analysis Area

The U.S. Census Bureau's 2013-2017 American Community Survey was used to identify if environmental justice communities occur in the analysis area. Estimates from the American Community Survey are all "period" estimates that represent data collected over a period of time (as opposed to "point-in-time" estimates, such as the decennial census, that approximate the characteristics of an area on a specific date) (Census 2018b).

Table 3.22-1 shows the race, ethnicity, and poverty percentages for each community (by Census block group, CCD, or reservation) in the environmental justice analysis area. The table also shows the corresponding demographics for Idaho's statewide population, which is applied as the general reference population for evaluating whether a community has a meaningfully greater (i.e., 5 percentage points or more) minority or low-income population.

In Valley and Adams counties, no community in the analysis area met the definition of an environmental justice community. Because of its proximity to the proposed SGP and its smaller population, the community of Yellow Pine was reviewed to determine its environmental justice status. Yellow Pine is in Block Group 2 of Census Tract 9701. However, in 2017 the population of this block group was 100 percent white, and only 7.0 percent of its residents had incomes below the federal poverty line, which is less than half of the statewide average (14.5 percent) (Census 2017). As a result, the community of Yellow Pine does not meet the definition of an environmental justice community.

3.22.4.2 Nez Perce Tribe

The Nez Perce Reservation is a geographically large area with a diverse population of 18,790 residents (Census 2017). Historically, the Nez Perce Tribe was a nomadic tribe that travelled the territory of what is now Idaho, Oregon, Washington, and Montana. Today, the Nez Perce Reservation encompasses portions of Nez Perce, Clearwater, Lewis, and Idaho counties in Idaho.

The Nez Perce CCD, which is a Census recognized subdivision within the Nez Perce Reservation, is located entirely within Idaho (see **Figure 3.22-1**) The majority (66 percent) of the reservation's 2,670 residents that self-identify as Native Americans live in the Nez Perce CCD. The Nez Perce CCD meets the definition of an environmental justice minority community based on its American Indian population (35.2 percent) and total minority population (48.4 percent), which are both meaningfully greater (i.e., 5 percentage points or more) than Idaho's statewide averages (1.1 percent American Indian and 17.4 percent total minority). The Nez Perce Tribe also meets the definition of an environmental justice low-income population, because the percentage of its residents with annual incomes below the federal poverty level (19.8 percent) is meaningfully greater (i.e., 5 percentage points or more) than Idaho's statewide average (14.5 percent).

3.22.4.3 Shoshone-Bannock Tribes of the Fort Hall Reservation

The Shoshone-Bannock Tribes of the Fort Hall Reservation are composed of the eastern and western bands of the Northern Shoshone and the Bannock bands. These tribes historically occupied vast regions of what is now Idaho, Oregon, Nevada, Utah, Wyoming, Montana, and areas of Canada (Idaho Centennial Commission Native Americans Committee 1992). The Fort Hall Reservation is located in southeast Idaho (see **Figure 3.21-2**).

The Fort Hall Reservation includes a population of 5,955 residents, of which approximately 58 percent self-identify as Native American (Census 2017). The Fort Hall Reservation meets the definition of an environmental justice minority community, as its American Indian population (58.4 percent) and total minority population (73.4 percent) are both meaningfully greater (i.e., 5 percentage points or more) than Idaho's statewide averages (1.1 percent American Indian and 17.4 percent total minority). The Fort Hall Reservation also meets the definition of an environmental justice low-income population, because the percentage of its residents with annual incomes below the federal poverty level (21.9 percent) is meaningfully greater (i.e., 5 percentage points or more) than Idaho's statewide average (14.5 percent).

3.22.4.4 Shoshone-Paiute Tribes of the Duck Valley Reservation

The Shoshone-Paiute Tribes of the Duck Valley Reservation historically occupied what is now Idaho, Nevada, and Oregon. In 1934, the Shoshone and Paiute united and formed a tribal government at the Duck Valley Reservation in southern Idaho/northern Nevada (see **Figure 3.21-2**).

The Duck Valley Reservation includes a population of 1,353 residents (Census 2017). Of these residents, approximately 84 percent self-identify as Native American. The Duck Valley Reservation meets the definition of an environmental justice minority community based on its American Indian population (83.9 percent) and total minority population (93.2 percent) are both meaningfully greater (i.e., 5 percentage points or more) than Idaho's statewide averages (1.1 percent American Indian and 17.4 percent total minority). The Duck Valley Reservation also meets the definition of an environmental justice low-income population, because the percentage of its residents with annual incomes below the federal poverty level (32.3 percent) is meaningfully greater (i.e., 5 percentage points or more) than Idaho's statewide average (14.5 percent).

3.22.4.5 Native American Use of Stibnite Gold Project Area

The environmental justice analysis also includes an evaluation of impacts that may affect a cultural, historical, or protected resource of value to a Native American Tribe or a minority population. The Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes traditional subsistence ranges include the SGP area. Refer to Section 3.17, Cultural Resources, and Section 3.24, Tribal Rights and Interests, for further discussion of the ethnographies of the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes, and resources important to these Tribes in the analysis area.

As discussed in Section 3.17, Cultural Resources, the Nez Perce Tribe and the Shoshone-Paiute Tribes have completed ethnographies that address traditional practices, tribal world view, traditional cultural properties, sacred sites, and traditional resource collection areas in the analysis area (Battaglia M. 2018; Walker Jr, D. 2019).The Shoshone-Bannock Tribes have begun their ethnographic work, but it is not yet completed.

Numerous areas throughout the Payette National Forest and the Boise National Forest have traditional, cultural, and spiritual significance for the tribes. Tribal use, preservation, and protection of these sacred areas are important means by which tribal members maintain their cultural and religious links to the past and their ancestors. Areas with more than one type of cultural significance to the tribes often include locations, such as mountain ridges, hot springs, waterfalls, trails, rock art panels, and traditional collection areas. Other landscape features of importance include Riordan Lake and high points in the landscape (e.g., mountain tops and ridgelines), which have religious significance and traditional plant gathering locations or collection areas. Refer to Section 3.17, Cultural Resources, and Section 3.24, Tribal Rights and Interests, for further discussion.

There are several traditionally collected plant and animal species, including various types of salmon, in the analysis area. These resources continue to be important to the tribes with interests in the area. As discussed in Section 3.17, Cultural Resources, and Section 3.24, Tribal Rights and Interests, restricted information received from the ethnographies of the Nez Perce Tribe and Shoshone-Paiute Tribes indicate that areas, resources, and off-reservation rights of concern and importance include fishing rights in the South Fork Salmon River watershed, including the East Fork South Fork Salmon River, Meadow Creek, Fiddle Creek, West End Creek, and Sugar Creek. Traditionally plants are thought to have provided over half of the diet of native people; supplemented with fish, mammals, and birds available in varying amounts.

The gathering of these traditional plants and animals continues to be a significant part of the individual cultures of the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes. The ethnographies identify specific fish, wildlife, and plants that are of traditional and continued cultural importance. The Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes see this hunting and gathering practice as an important link to their past. Furthermore, due to their concern with maintaining this aspect of their cultures, the Tribes are taking an increasingly active role in the protection and restoration of various species of plants, animals, and fish.

In 1998, the Nez Perce Tribe started the Johnson Creek Artificial Propagation Enhancement Project in response to critically low numbers of returning adult Chinook salmon to Johnson Creek. The Nez Perce Tribe and Idaho Fish and Game also supplement adult Chinook salmon into Meadow Creek and the East Fork South Fork Salmon River, upstream of the Yellow Pine pit at the existing mine site. See Section 3.12, Fish Resources and Fish Habitat, for additional details.

Table 3.22-1 Race, Ethnicity, and Poverty for Valley and Adams County, and Tribes

Geography	White Alone[1]	Hispanic[2] Origin	African American	American Indian and Alaska Native	Asian	All Other Minorities[3]	Total Minority[4]	Below Federal Poverty Level
State of Idaho	82.5%	12.2%	0.6%	1.1%	1.3%	2.2%	17.4%	14.5%
Block Group 1, Census Tract 9701, Valley County, Idaho	94.9%	1.3%	0.8%	0.0%	0.0%	3.1%	5.1%	15.0%
Block Group 2, Census Tract 9701, Valley County, Idaho	100%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.0%
Block Group 3, Census Tract 9701, Valley County, Idaho	96.6%	2.2%	0.0%	0.0%	0.0%	1.2%	3.4%	6.3%
Block Group 1, Census Tract 9702, Valley County, Idaho	97.2%	0.0%	0.0%	0.1%	0.0%	0.1%	2.8%	9.0%
Block Group 2, Census Tract 9702, Valley County, Idaho	97.8%	0.0%	0.1%	1.2%	0.8%	0.0%	2.2%	2.4%
Block Group 1, Census Tract 9703, Valley County, Idaho	84.9%	15.0%	0.0%	0.1%	0.0%	0.0%	15.1%	8.9%
Block Group 2, Census Tract 9703, Valley County, Idaho	93.1%	6.3%	0.0%	0.0%	0.0%	0.6%	6.9%	17.2%
Block Group 1, Census Tract 9501, Adams County, Idaho	87.6%	7.5%	0.0%	1.8%	0.0%	3.1%	12.4%	11.8%
Block Group 1, Census Tract 9502, Adams County, Idaho	96.2%	0.8%	0.8%	0.4%	0.0%	1.8%	3.8%	18.0%

Geography	White Alone[1]	Hispanic[2] Origin	African American	American Indian and Alaska Native	Asian	All Other Minorities[3]	Total Minority[4]	Below Federal Poverty Level
Block Group 2, Census Tract 9502, Adams County, Idaho	94.8%	0.7%	0.0%	1.8%	0.0%	2.6%	5.2%	9.8%
Nez Perce CCD[5], Nez Perce County, Idaho	51.6%	6.2%	0.5%	**35.2%**	0.4%	6.1%	**48.4%**	**19.8%**
Duck Valley Reservation[6]	6.8%	5.1%	0.2%	**83.9%**	0.9%	3.1%	**93.2%**	**32.3%**
Fort Hall Reservation[6]	26.6%	11.9%	0.0%	**58.4%**	1.0%	2.0%	**73.4%**	**21.9%**

Table Source: Census 2017

Table Notes:

1 Non-Hispanic White population only, as a basis of comparison for minority groups.

2 Hispanic is an ethnicity which could include any race, including White.

3 All Other Minorities includes Native Hawaiian and Other Pacific Islander, some other race, and two or more races.

4 Total minority equals total population minus the Non-Hispanic White population.

5 CCD = Census County Subdivision – A county subdivision delineated cooperatively by the Census and local government authorities.

6 Census identified American Indian Reservation areas and populations.

Bold indicates block group or CCD meets the definition of an environmental justice community.

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3.23 SPECIAL DESIGNATIONS

3.23.1 Wilderness

3.23.1.1 Introduction and Scope of Analysis

This section addresses designated wilderness and recommended wilderness and describes the characteristics of these areas. Designated wilderness is any area of land designated by Congress as part of the National Wilderness Preservation System that was established in the Wilderness Act of 1964. Recommended wilderness are those areas (generally identified during the preparation or revision of Forest Land and Resource Management Plans) that the United States Forest Service (Forest Service) recommends to Congress as candidates for designation as wilderness. Only Congress can designate wilderness. The analysis area for wilderness consists of the Frank Church-River of No Return Wilderness (FCRNRW) in the Payette National Forest (PNF) Management Area (MA) 14, Boise National Forest (BNF) MA 22, and a portion of the Salmon-Challis National Forest (SCNF) with Big Creek as the northern boundary and the Middle Fork Salmon River as the eastern and southern boundary. The analysis area also includes recommended wilderness within PNF MA 12 South Fork Salmon River and BNF MAs 18 Cascade Reservoir and 19 Warm Lake (**Figure 3.23-1**). **Table 3.23-1** provides the acres of FCRNRW and recommended wilderness within the analysis area for the PNF, BNF, and SCNF (Forest Service 2003a, 2010).

Table 3.23-1 Analysis Area Designated Wilderness and Recommended Wilderness

National Forest	FCRNRW Acres	Recommended Wilderness Acres
Payette National Forest, Krassel Ranger District	247,708	171,987
Boise National Forest[1] Cascade Ranger District	332,891	3,300
Salmon-Challis National Forest	56,223	0
Total	636,822	175,287

Table Source: Forest Service 2003a,b, 2010

Table Notes:

1 FCRNRW acres located on the BNF were assigned to the SCNF in 1991.

3.23.1.2 Relevant Laws, Regulations, Policies, and Plans

3.23.1.2.1 WILDERNESS ACT OF 1964

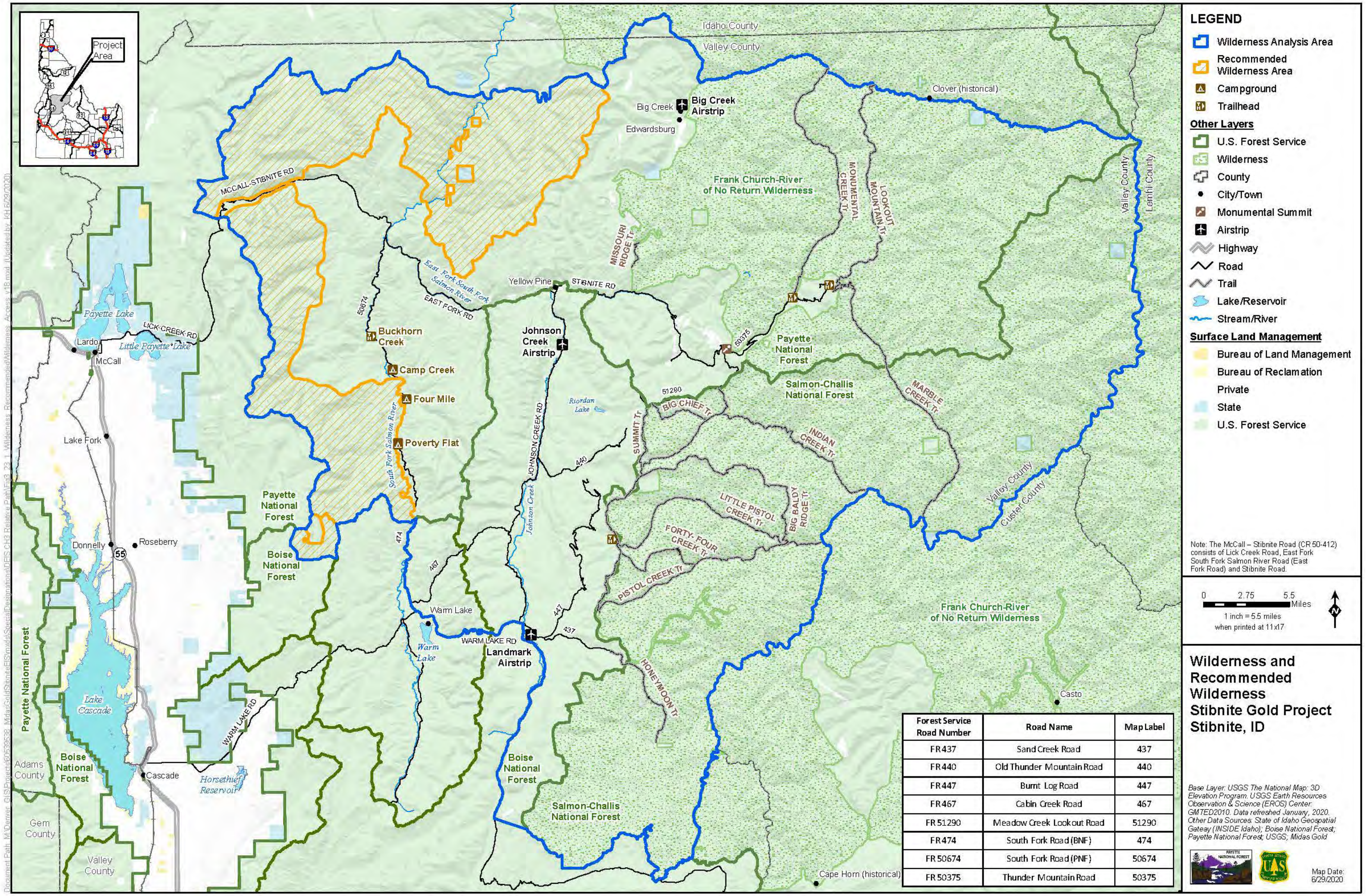
The Wilderness Act of 1964 mandates that “each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area

(Section 4(b)).” As defined by section 2(c) of the Wilderness Act:

> *“A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserves its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.”*

The Wilderness Act identifies five qualities of wilderness. Landres et al. (2008) defined four of these qualities:

- “Untrammeled” – wilderness is unhindered and free from modern human control or manipulation. Untrammeled areas are areas where the components or processes of ecological systems inside the wilderness are not controlled or manipulated by modern human activities. As defined by the Forest Service Manual 2320.5: “In the context of the Wilderness Act, an untrammeled area is where human influence does not impede the free play of natural forces or interfere with natural processes in the ecosystem.”
- “Natural” – wilderness ecological systems are substantially free from the effects of modern civilization. According to Arthur Carhart National Wilderness Training Center (2014), preserving this quality ensures that indigenous species, patterns, and ecological processes are protected and allows us to understand and learn from natural features.
- “Undeveloped” – wilderness is substantially without permanent improvements or modern human occupation, such as the presence of structures, installations, habitations, or the use of motor vehicles, motorized equipment, or mechanical transport.
- “Outstanding opportunities” – wilderness provides opportunities for people to experience solitude or primitive and unconfined recreation, including the values of inspiration and physical and mental challenges. Solitude is multi-dimensional and tends to be deeply personal. Wilderness managers often define solitude by the absence of others. Primitive recreation often refers to the types of recreation that require primitive travel and self-reliance without modern conveniences (Landres et al. 2008). Unconfined recreation refers to the types of recreation where visitors experience a high degree of freedom over their own actions.



Forest Service Road Number	Road Name	Map Label
FR437	Sand Creek Road	437
FR440	Old Thunder Mountain Road	440
FR447	Burnt Log Road	447
FR467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 50375	Thunder Mountain Road	50375

Figure Source: AECOM 2020

Figure 3.23-1 Wilderness and Recommended Wilderness

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Section 2(c)(4) of the Wilderness Act says these areas “may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.” Some of these features, such as the presence of threatened and endangered species, also are part of the natural quality of a wilderness. Other features, such as the presence of important geological formations, cultural resources, historic sites, or paleontological localities, may be significant or integral to the wilderness area and do not fit easily into one of the other four qualities of wilderness character. Other features of value must be just as rigorously protected as the qualities of wilderness character (Arthur Carhart National Wilderness Training Center 2014).

The Forest Service Handbook (FSH) (FSH-1909.12, Chap. 7) discusses these attributes of wilderness and discusses additional attributes to be considered in evaluating potential wilderness areas. These values include the contributions of wilderness to cultural and historic preservation; opportunities for self-discovery, self-reliance, and challenge; the scenic beauty of an area; and individual and social well-being.

3.23.1.2.2 CENTRAL IDAHO WILDERNESS ACT

On July 23, 1980, the U.S. Congress passed the Central Idaho Wilderness Act, Public Law 96-312. This act created the 2,361,767-acre River of No Return Wilderness. Senator Frank Church’s name was added in 1984 by Public Law 98-231 in recognition of his efforts in passing the Central Idaho Wilderness Act.

3.23.1.2.3 36 CFR 293 - WILDERNESS – PRIMITIVE AREAS

Federal policy related to designated wilderness areas in the National Forest System (NFS) can be found in 36 Code of Federal Regulations (CFR) 293. The objectives related to wilderness can be found in 36 CFR 293.2. Forest Service policy related to the management of designated wilderness lands can be found in Forest Service Manual 2320 – Wilderness Management.

3.23.1.2.4 NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

In 2003, the Salmon-Challis National Forest completed the Frank Church-River of No Return Wilderness Management Plan (Forest Service 2003b). Management direction in the plan is derived from the Wilderness Act and subsequent legislation that aimed to protect these special areas and preserve wilderness character.

The Payette National Forest Land and Resource Management Plan (Payette Forest Plan) and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2003a, 2010) also have standards and guidelines for designated wilderness and recommended wilderness areas. The desired condition for people visiting wilderness in the National Forest is to find outstanding opportunities for primitive and unconfined recreation, including exploration, solitude, risk, and challenge. Wilderness areas are primarily affected by the forces of nature, with human imprint being substantially unnoticeable. For recommended wilderness areas, the Forest Service preserves the unique wilderness character of these areas until Congress acts on the Forest Service recommendation. **Figure 3.23-1** shows the location of the FCRNRW and recommended wilderness areas on the PNF and BNF in the analysis area.

The Payette Forest Plan and the Boise Forest Plan include management prescriptions and practices for specific areas, including designated wilderness (Management Prescription Category [MPC] 1.1) and recommended wilderness (MPC 1.2). The goal of MPC 1.1 is to "Protect wilderness values as defined in the 1964 Wilderness Act. Improve opportunities and experiences through the development of individual wilderness management plans, partnerships with permittees and user groups, and interpretive and educational opportunities."

Under MPC 1.2, actions must be designed and implemented in a manner that does not compromise wilderness values or reduce the area's potential for wilderness designation. The goal of MPC 1.2 is to manage recommended wilderness to protect wilderness values as defined in the Wilderness Act. Activities permitted in recommended wilderness must not compromise wilderness values or reduce the area's potential for wilderness designation.

3.23.1.3 Existing Conditions

The FCRNRW covers over 2 million acres in central Idaho (**Figure 3.23-1**) and is the largest contiguous wilderness in the continental 48 states and the largest in the NFS. As the largest block of primitive and undeveloped land outside Alaska, this wilderness is of national importance (Forest Service 2003b). Recommended wilderness in the analysis area includes areas within the PNF and BNF east of McCall and north of Warm Lake. The FCRNRW and recommended wilderness areas include seven general land types: 1) lower river canyon lands; 2) upper river canyon lands; 3) rolling basin lands; 4) low relief fluvial lands; 5) steep volcanic lands; 6) steep granitic fluvial lands; and 7) glaciated lands. Elevations in the FCRNRW and recommended wilderness range from less than 2,000 feet in the lower river canyon bottoms to over 10,000 feet on higher mountain peaks (Forest Service 2009).

The existing conditions of wilderness within the analysis area relative to the five qualities of wilderness identified in the Wilderness Act (untrammeled, natural, undeveloped, opportunities for solitude or primitive and unconfined recreation, and other features of value) are discussed in the following sections.

3.23.1.3.1 UNTRAMMELED

The FCRNRW and recommended wilderness within the analysis area consist of large expanses where natural forces provide a wide and constantly changing variety of habitats and conditions. Natural ecological processes prevail, and many areas are unmanipulated by human activities. Wilderness character in the FCRNRW is affected by its variety of uses; however, wilderness retains a wild, uncontrolled nature that is indicative of its untrammeled character. Ecological processes, such as fires, floods, native species, and predator-prey relationships prevail (natural character).

The FCRNRW is actively managed for control of non-native invasive plant species to help maintain native plant communities. Non-native invasive plants have the potential to damage biological diversity and naturally functioning ecosystems. The FCRNRW Noxious Weed Treatments Final Supplemental Environmental Impact Statement (Forest Service 2007) identifies invasive weed sites along Big Creek and the Middle Fork Salmon River.

Implementation of the Forest Service's noxious/invasive weed management program in the FCRNRW includes the use of herbicides and restoration of weed sites to a native plant community. The Valley County weed program identifies the presence of 18 noxious weeds and non-native invasive plant species in the FCRNRW and recommended wilderness areas. These include spotted knapweed, oxeye daisy, Canada thistle, and rush skeleton weed (Valley County 2019).

3.23.1.3.2 NATURAL

Natural ecological systems inside the FCRNRW and recommended wilderness have been, and continue to be, affected by conditions and actions beyond the wilderness boundary. For example, threatened or endangered mammals, birds, fish, flowering plants, and insects are found in the FCRNRW and recommended wilderness areas that have been affected by human actions outside of wilderness. The tributaries to the East Fork and the Middle Fork of the Salmon River provide natural conditions that range from good to excellent in terms of water quality for domestic use, recreational use, and wildlife in the wilderness. Water quality is functioning at risk in localized areas due to sedimentation impacts from historical livestock grazing, compounded by naturally high sediment rates. Existing surface water quality in the analysis area is discussed in Section 3.9.3.1, Affected Environment, Surface Water Quality.

Indigenous plant and animal species and habitat are an integral part of the natural quality of wilderness. In the FCRNRW and recommended wilderness areas, vegetation communities vary from ponderosa pine/bluebunch wheatgrass or Idaho fescue and Douglas fir/ninebark or snowberry at lower elevations to subalpine fir types at higher elevations. Habitat alterations due to fires in the wilderness have created brush fields, lodgepole pine stands, snag patches, and variations in species and age classes of vegetation (Forest Service 2003b; Herron and Freeman 2008). Following a fire, especially in areas that burned with high intensity, the potential for noxious/invasive weed invasion increases (Brooks and Lusk 2008). Weed managers in the FCRNRW have observed the spread of noxious/invasive weeds into burned areas, especially adjacent to existing weed sites (Forest Service 2007).

Terrestrial habitat is at or near natural functioning condition. Levels of disturbance and fragmentation are very low (Forest Service 2010). Non-native wildlife species, which were introduced into the wilderness prior to designation, include chukar partridge and gray (Hungarian) partridge. The FCRNRW provides habitat for native resident and anadromous fish species. California golden trout and Arctic grayling have been introduced into some lakes and streams (Herron and Freeman 2008).

The "airshed" associated with the FCRNRW consists of areas both directly above the wilderness, as well as areas above lands adjacent to its boundary. The FCRNRW is designated as a Class II airshed. Management of air quality in the FCRNRW includes monitoring to ensure that outside influences are not degrading the air quality beyond the Clean Air Act Class II standards. Existing air quality conditions and Class II standards are discussed in Section 3.3, Air Quality.

3.23.1.3.3 UNDEVELOPED

Human development in the FCRNRW and recommended wilderness is mostly associated with visitor use, such as trailheads and backcountry airstrips. Aircraft use is prevalent during the late spring and summer months; during winter, backcountry flights are generally associated with flights into established airstrips, including those on private inholdings. Along the western wilderness boundary of the FCRNRW, access roads are dirt roads with high elevation passes that are closed by snow during the winter. Access roads to the recommended wilderness areas also are dirt roads, except for the South Fork Salmon River Road (National Forest System Road [FR] 50674), which is a single-lane road with an asphalt paved surface (**Tables 3.23-2** and **3.23-3**).

Table 3.23-2 Access Roads and Trailheads for the FCRNRW in the Analysis Area

National Forest and Ranger District	National Forest System Roads (FR)	Trailheads
Payette National Forest Krassel Ranger District	Big Creek-Smith Creek Road (FR 50371) Meadow Creek Lookout Road (FR 51290) Thunder Mountain Road (FR 50375) Lick Creek portion of McCall-Stibnite Road (County Road [CR] 50-142)	Big Creek/Smith Creek, Lick Creek, Monumental, Lookout Mountain
Boise National Forest Cascade Ranger District	Artillery Dome Road (FR 447e) Springfield Mine Road (FR 440a)	Pistol Lake, Snowshoe Summit, North Fork, Sulfur Creek, Elk Creek

Table Source: Forest Service 2003a, 2010

Table 3.23-3 Access Roads and Trailheads for the Recommended Wilderness in the Analysis Area

National Forest and Ranger District	National Forest System Roads (FR)	Trailheads
Payette National Forest Krassel Ranger District	South Fork Salmon River Road (FR 50674) Zena Creek Road (FR 50361)	Blackmare Creek, Buckhorn Creek, Cow Creek, Fitsum Creek
Boise National Forest Cascade Ranger District	South Fork Salmon River Road (FR 50474) Gold Fork Meadow Road (FR 497.1)	North Fork, Gold Fork, South Fork

Table Source: Forest Service 2019

Additional human development in the FCRNRW includes a very high frequency repeater site at Artillery Dome, Forest Service guard stations and patrol cabins, Big Creek and Indian Creek public airstrips, and private airstrips.

3.23.1.3.4 OPPORTUNITIES FOR SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION

The FCRNRW and recommended wilderness areas provide a wide variety of user opportunities for exploration, solitude, natural environment, risk, challenge, and primitive and unconfined recreation. Visitors use outfitter and guide services in the FCRNRW and recommended wilderness areas to take part in hiking, horseback riding, hunting, fishing, floating, and rafting.

Opportunities for solitude are affected by concentrated patterns of use in certain seasons along with the presence of access roads, trailheads, and structures associated with administrative sites. Opportunities for primitive and unconfined recreation are seasonally affected in high- use areas. In areas away from access roads, trailheads, administrative sites, and other areas of concentrated use, the FCRNRW and the recommended wilderness areas offer outstanding opportunities for solitude and primitive and unconfined recreation. These areas also provide outstanding opportunities for solitude and primitive and unconfined recreation during winter.

3.23.1.3.5 OTHER FEATURES OF VALUE

The FCRNRW and recommended wilderness areas also preserve “ecological, geological, or other features of scientific, educational, scenic, or historic value,” as identified in section 2(c) of the Wilderness Act. This quality captures important elements of the wilderness, such as cultural or paleontological resources, that may not be covered in the other four qualities.

3.23.2 Wild and Scenic Rivers

3.23.2.1 Scope of Analysis

The analysis area for Wild and Scenic Rivers (WSRs) includes the study corridors for those rivers determined to be eligible and suitable for inclusion in the National WSR System (National System) that intersect with the Stibnite Gold Project (SGP) area and the management areas associated with these waterways. Study corridors extend 0.25 mile on either side from the high-water mark of each eligible or suitable river segment. **Figure 3.23-2** shows the location of study corridors in relation to proposed SGP components. Specific river segments that are crossed by SGP components and are the focus of this analysis include: Burntlog Creek (eligible), Johnson Creek (eligible), and South Fork Salmon River (suitable) (Forest Service 2003, 2010).

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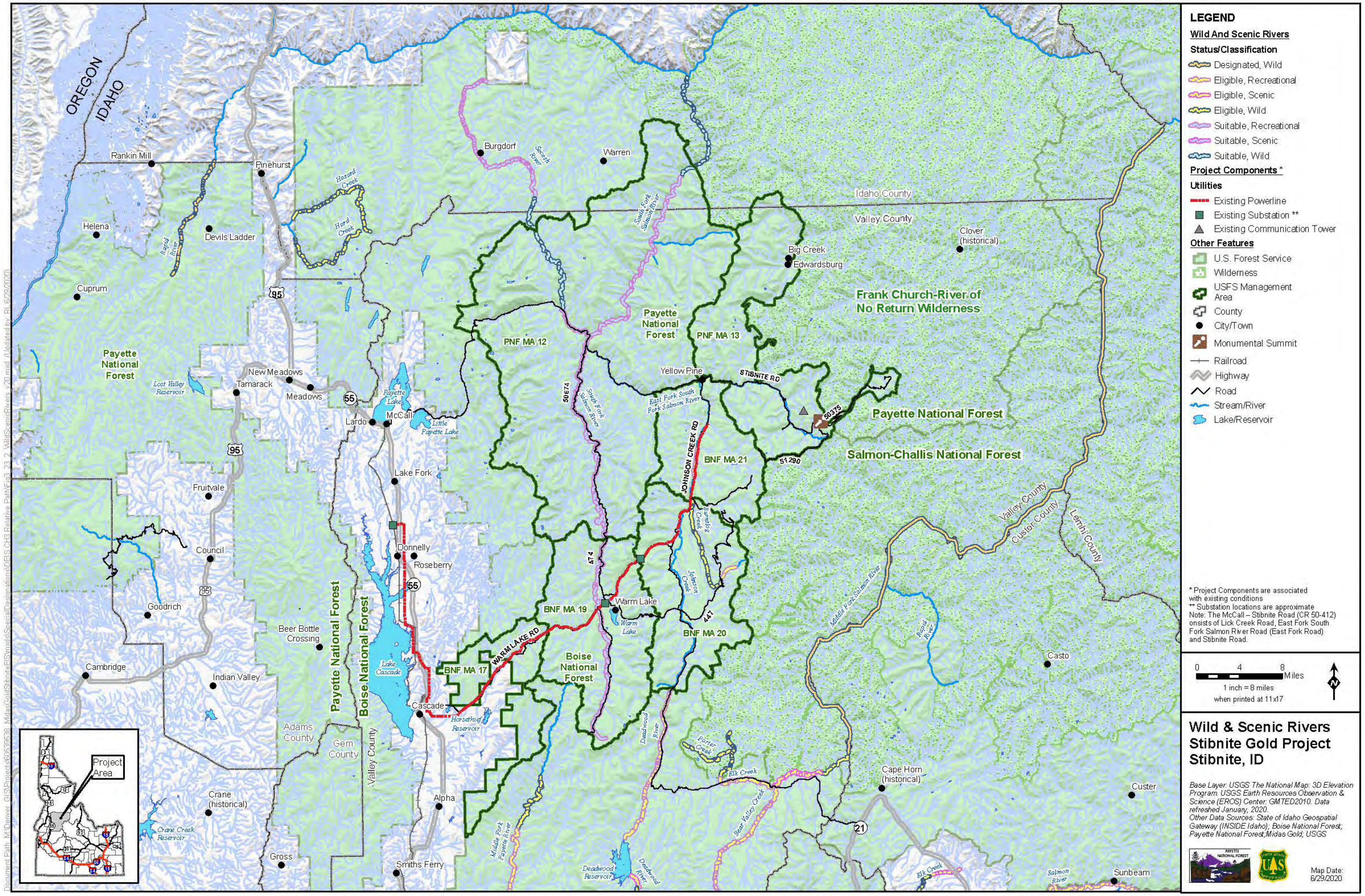

Figure Source: AECOM 2020

Figure 3.23-2 Wild and Scenic Rivers

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3.23.2.2 Relevant Laws, Regulations, Policies, and Plans

3.23.2.2.1 WILD AND SCENIC RIVERS ACT (PUBLIC LAW 90-542; 16 USC 1271-1287)

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 United States Code [USC] 1271 et seq.), to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. There are four steps in the WSRs process under the Act.

1. Inventory: Develop a systematic and comprehensive inventory of rivers to consider for their potential eligibility.
2. Eligibility Determination: Determine Stream eligibility under the criteria listed in the WSR Act.
3. Classification: Based on the level of development of the shoreline, waterway, and access when the river is found eligible, classify each waterway as wild, scenic, or recreational.
4. Suitability Determination: Evaluate the potential physical, biological, economic, and social effects of adding the river to the National System. A suitability study provides the basis for determining what rivers to recommend to Congress as potential additions to the National System.

As discussed in more detail below, the PNF and BNF have previously performed the first three of these steps for waterways in and around the SGP area and completed step 4 for the South Fork Salmon River.

3.23.2.2.1.1 River Management Provisions

The WSR Act requires agencies to protect rivers that they have identified as having "outstandingly remarkable values," free-flowing condition, and associated water quality. The requirements and processes to protect these river values through coordinated federal actions are detailed in several sections of the WSR Act. Specific management prescriptions for eligible river segments include:

- Free-flowing values. Free-flowing characteristics of eligible river segments cannot be modified by stream impoundments, diversions, channelization, or rip-rapping to the extent authorized under law.
- Outstandingly Remarkable Values (ORVs). Each segment is managed to protect ORVs (subject to valid existing rights) and, to the extent practicable, such values are enhanced.
- Classification impacts. Management and development of the eligible river and its corridor cannot be modified, subject to valid existing rights, to the degree that its eligibility or classification would be affected.

3.23.2.2.1.2 Section 7 of the WSR Act

Section 7(a) of the WSR Act provides a specific standard for review of developments on or directly affecting a designated WSR river segment. Development may occur if the project "will not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area as of the date of designation…" This standard applies to projects outside the designated river corridor but on the same river or a tributary.

Because the SGP area includes in-water components located on the East South Fork Salmon River, a tributary (via the South Fork Salmon River) to the designated WSR Salmon River, a Section 7 analysis would be required. The Section 7 document would be completed once the Forest Service has fully considered the environmental consequences along with agency and public input of all action alternatives and prior to any decision on the National Environmental Policy Act document.

3.23.2.2.2 Visual Management System

The Forest Service is directed by policy to inventory, classify, and manage lands for their scenic resource values. Scenic resources are managed through Visual Quality Objectives (VQOs) designed to provide measurable standards that direct levels of acceptable visual change (Forest Service 1974). The range of VQOs is defined as follows:

- *Preservation (P)* – Allows natural changes only.
- *Retention (R)* – Allows management activities that are not visually evident.
- *Partial Retention (PR)* – Management activities may repeat form, line, color, or texture common to the characteristic landscapes but changes in their size, amount, intensity, direction, pattern, etc. should remain visually subordinate.
- *Modification (M)* – Management activities may visually dominate the original landscape. However, alteration must borrow from naturally established form, line, color, or texture so that visual characteristics are those of natural occurrences of the surrounding area.
- *Maximum Modification (MM)* – Management activities of vegetative and land alterations form may dominate the characteristic landscape.

Per forest-wide standards and guidelines contained in the Payette Forest Plan (Forest Service 2003) and Boise Forest Plan (Forest Service 2010), VQOs are assigned to eligible and suitable WSR segments based on their preliminary classification, as follows:

- Preservation to a wild classification,
- Retention to a scenic classification,
- Partial retention to a recreational classification.

3.23.2.2.3 STATE REGULATIONS

No state regulations directly address eligible, suitable, or designated WSRs. The Idaho State Water Resources Board has not designated state-protected rivers in the Salmon River basin.

The Idaho Stream Channel Protection Act requires that the stream channels of the State and their environment be protected against alteration for the protection of fish and wildlife habitat, aquatic life, recreation, aesthetic beauty and water quality. As a result of the Stream Channel Protection Act, the Idaho Department of Water Resources must approve in advance any work proposed within the bed and banks of a continuously flowing stream.

3.23.2.2.4 NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

Per the WSR Act, the Forest Service manages river segments and their corridors that are eligible or suitable for inclusion in the National System to retain their free-flowing status; water quality; WSR classification; and ORVs for scenery, wildlife, cultural, fish, geology, hydrology, ecological, or botanical resources, as applicable.

3.23.2.2.4.1 Forest Plan Goals, Objectives, and Desired Future Conditions Relevant to this Resource

The Payette Forest Plan and the Boise Forest Plan provide direction for managing WSRs. **Table 3.23-4** and **Table 3.23-5** list the applicable standards and guidelines under these forest plans for assessing impacts on eligible, suitable, and designated WSRs.

3.23.2.2.4.2 Forest-wide Standards and Guidelines

The following direction applies to eligible, suitable, and designated WSR segments.

Table 3.23-4 Forest-wide Standards and Guidelines for Eligible, Suitable, and Designated Wild and Scenic Rivers

Forest Plan	Direction	Number	Management Direction Description
PNF; BNF	Standard	WSST01	When proposed management actions may compromise the ORVs, WSR classification, or free-flowing character of an eligible WSR segment, a suitability study must be completed for that segment prior to initiating the actions.
PNF; BNF	Standard	WSST02	Assign VQOs to the classifications of eligible, suitable, and designated WSR corridors as follows: a) Preservation to a wild classification b) Retention to a scenic classification c) Partial Retention to a recreational classification
PNF; BNF	Guideline	WSGU01	Coordinate any suitability studies for eligible segments (as applicable where a river crosses jurisdictions) with: a) Idaho Department of Water Resources, b) Bureau of Land Management (BLM), or c) Other national forests

Table Source: Forest Service 2003, 2010

Table Notes:

BNF = Boise National Forest; PNF = Payette National Forest; VQOs = visual quality objectives Management Area Standards and Guidelines

Table 3.23-5 Management Area Standards and Guidelines for Wild and Scenic Rivers

Forest Plan/MA	Direction	Number	Management Direction Description
PNF/MA 12	General Objective	1207	Work with BNF to recommend the South Fork Salmon and Secesh rivers for designation under the WSR Act.
PNF/MA 12	General Objective	1208	Manage the South Fork Salmon River and Secesh River suitable corridors to their WSR classifications, and preserve their ORVs and free-flowing status, until they are designated by Congress or released from further consideration as WSRs.
BNF/MA 19	Suitable WSRs: General Standard	1907	Manage the South Fork Salmon River to its recreational classification and preserve its free-flowing status and ORVs until it is formally designated by Congress or released from further consideration as a WSR candidate.
BNF/MA 19	Suitable WSRs: Vegetation Standard	1984	Mechanical vegetation management shall retain all large snags and at least the max number of snags in each size class. If large snags are unavailable, retain additional snags to meet at least the max number snags per acre.
PNF/MA 12; BNF/MA 19, MA 20, MA 21	Suitable WSRs: Vegetation Guideline	1908	In recreational corridors, mechanical vegetation treatments, including salvage harvest, may be used as long as ORVs are maintained within the river corridor.
PNF/MA 12; BNF/MA 19, MA 20, MA 21	Suitable WSRs: Fire Guideline	1909	Prescribed fire and wildland fire use may be used as long as ORVs are maintained within the corridor.
PNF/MA 12; BNF/MA 19, MA 20, MA 21	Suitable WSRs: Fire Guideline	1910	The full range of fire suppression strategies may be used to suppress wildfires. Emphasize tactics that minimize impacts of suppression activities on river classifications and ORVs.
BNF/MA 20	Eligible WSRs: General Standard	2001	Eligible: Manage the Burntlog Creek corridor to its assigned classifications and preserve its ORVs and free-flowing status until the river undergoes a suitability study and the study finds it suitable for designation by Congress or releases it from further consideration as a WSR.
BNF/MA 20	Eligible WSRs: Vegetation Standard	2053	Mechanical vegetation management shall retain all large snags and at least the max number of snags in each size class. If large snags are unavailable, retain additional snags to meet at least the max number snags per acre.
BNF/MA 21	Eligible WSRs: General Standard	2101	Manage the Johnson Creek corridor to its recreational classification and preserve its ORVs and free-flowing status until the river undergoes a suitability study and the study finds it suitable for designation by Congress, or releases it from further consideration as a WSR.
BNF/MA 21	Eligible WSR: Vegetation Standard	2156	Mechanical vegetation management shall retain all large snags and at least the max number of snags in each size class. If large snags are unavailable, retain additional snags to meet at least the max number snags per acre.

Table Source: Forest Service 2003, 2010

3.23.2.3 Existing Conditions

Rivers in the PNF, BNF, and nearby Sawtooth National Forest were evaluated in 1997 in order to determine their eligibility for inclusion in the National System (Forest Service 2010). The 1997 WSR study evaluated 889 streams and identified 45 with potential ORVs. These 45 streams were segmented and assigned preliminary classifications of recreational, scenic, or wild.

The analysis area for WSRs includes three of the streams identified as eligible during the 1997 study including the South Fork Salmon River, Burntlog Creek, and Johnson Creek. A suitability study for the South Fork Salmon River was performed as part of the Payette Forest Plan in 2003, and the South Fork Salmon River was determined to be suitable (Forest Service 2003). These waterbodies and their ORVs are discussed below. The SGP would intersect WSR corridors at the proposed access roads and utility corridors.

3.23.2.3.1 SOUTH FORK SALMON RIVER

The South Fork Salmon River runs for 86 miles from its headwaters in the BNF, through the PNF, to its confluence with the Salmon River. A combined suitability study of the PNF and BNF concluded that the South Fork Salmon River is suitable for WSR designation. **Figure 3.23-3** shows the intersection of the suitable South Fork Salmon River corridor and the existing transmission line and Warm Lake Road crossing of the river. This is where the SGP proposed transmission line upgrade intersects the South Fork Salmon River.

This river segment is in BNF MA 19 Warm Lake. In that management area, the river is an estimated 27.5 miles long, with an estimated river corridor area of 8,100 acres.

The river has a preliminary WSR classification of recreational. Recreational segments have a designated VQO of partial retention, as described in Section 3.23.2.3 above. The South Fork Salmon River is recognized for the following ORVs (Forest Service 2003):

- **Recreation:** As a major tributary to the WSR-designated Salmon River, the river supports whitewater recreation opportunities from around the nation.
- **Scenic:** The river is a Level 1 visually sensitive route. Level 1 applies to areas where significant public use occurs and where visual quality is of high concern to typical users. Examples of such routes may include recreational lakes and rivers that provide a high level of scenic quality.
- **Geological:** There are outstanding geological features through the river corridor.
- **Cultural:** The river is a significant area for Native American interests; it contains cultural and historic properties and the river is a major fishery for the Nez Perce Tribe and Shoshone-Bannock Tribes.

- **Botanical:** Populations of rare plants and plant communities exist along the river corridor.
- **Fisheries:** The river is one of three drainages in Idaho supporting wild native steelhead; bull trout are found in all reaches; the river supports bull trout and westslope cutthroat spawning, rearing, and migration habitat; and supports prime populations of federally listed anadromous fish species.

South Fork Salmon River Road (FR 50674/474) is an asphalt road that parallels the South Fork Salmon River. It is plowed in winter and open to highway-legal vehicles. Currently, South Fork Salmon River Road provides the only winter vehicle access to the village of Yellow Pine and the connecting road (Stibnite Road portion of McCall-Stibnite Road [CR 50-412]) to the mine site. This road is compatible with the recreational classification of the river. Annual average daily traffic information has not been compiled on the South Fork Salmon River Road for the SGP.

Detailed baseline data for existing water quality where the component alternatives intersect the South Fork Salmon River at Warm Lake Road (CR 10-579) have not been compiled. The Idaho Department of Environmental Quality (IDEQ) has designated total maximum daily load targets for sediment on the South Fork Salmon River (IDEQ 2011).

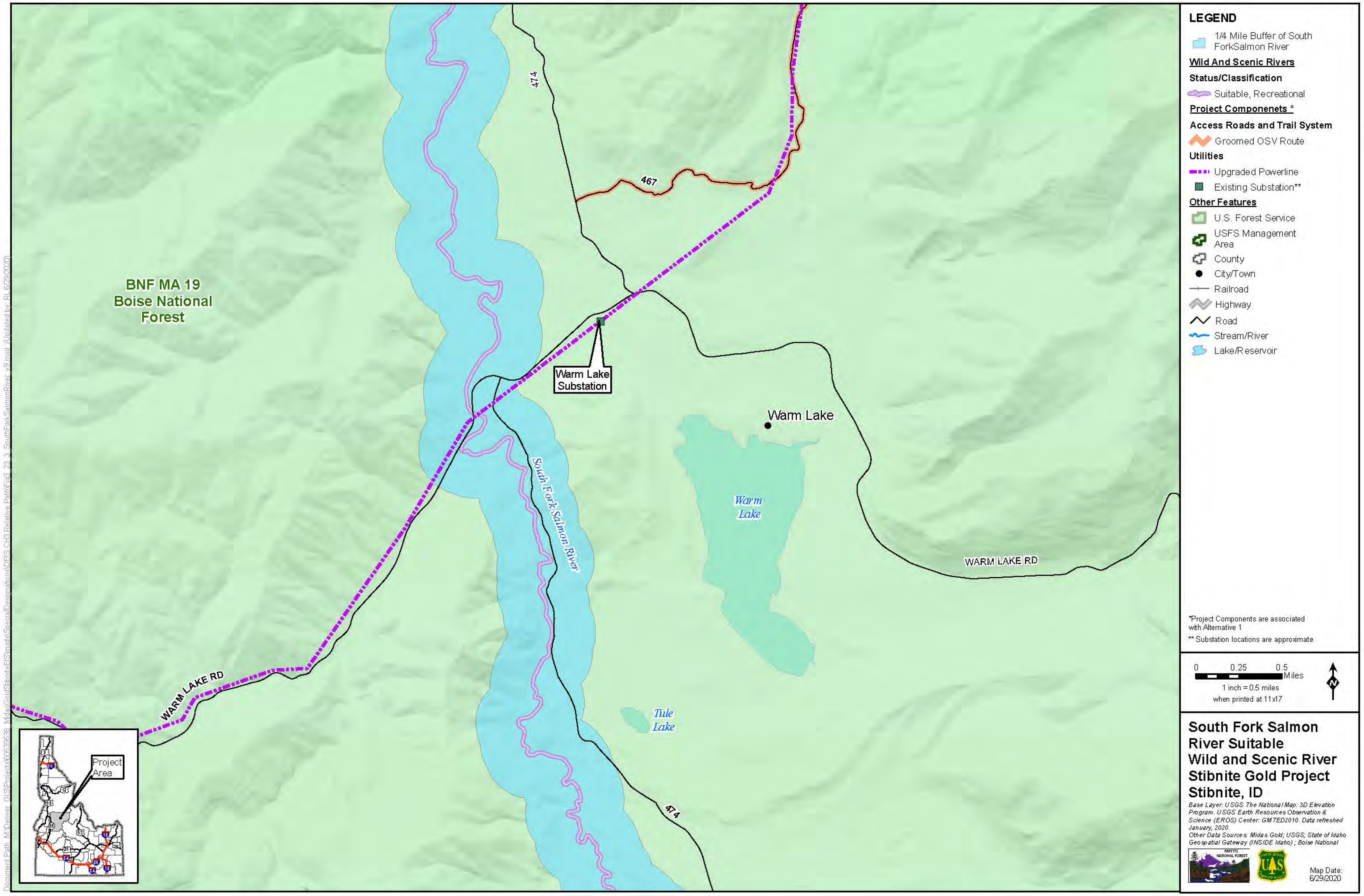

Figure Source: AECOM 2020

Figure 3.23-3 South Fork Salmon River Suitable Wild and Scenic River

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3.23.2.3.2 BURNTLOG CREEK

Burntlog Creek, located in MA 20 Upper Johnson Creek, is eligible for inclusion in the National System from its headwaters to its confluence with Johnson Creek. Burntlog Creek has an ORV for fish (Forest Service 2010), as it is a Pacfish/Infish priority watershed that supports spawning and rearing habitat for wild Chinook salmon, steelhead, cutthroat trout, redband trout, and bull trout. From its headwaters to the crossing of Burnt Log Road (FR 447), Burntlog Creek is eligible as a recreational river. Downstream of Burnt Log Road it is eligible as a wild river. **Figure 3.23-4** shows its location. The VQO for the recreational segment is partial retention. The VQO for the wild segment is preservation.

Burnt Log Road crosses Burntlog Creek and several of its tributaries. It separates the recreational segment upstream of the road from the wild segment downstream. As discussed in Section 3.16, Access and Transportation, it is a one-lane native surfaced road maintained to Forest Service maintenance level 3 (i.e., usable by prudent driver in a passenger car). The road includes turnouts and is infrequently groomed as a snowmobile route in winter. Burnt Log Road includes a culvert crossing at Burntlog Creek; traffic counts along the beginning of Burnt Log Road (where it joins Warm Lake Road [CR 10-579]) showed an annual average daily traffic volume of 27 vehicles (summer).

From downstream of the Burnt Log Road crossing to its confluence with Johnson Creek, the waterway has a preliminary classification as wild. The estimated 10.9-mile wild segment has a river corridor area of 3,475 acres. This segment also is in the Burntlog Inventoried Roadless Area (Forest Service 2010). There are no utility rights-of-way located in the Burntlog Creek corridor.

The upper segment of Burntlog Creek, from its headwaters to where it crosses Burnt Log Road, has a preliminary classification of recreational. The approximately 1.9-mile recreational segment has a river corridor area of 615 acres.

Detailed baseline information on existing water quality in Burntlog Creek has not been compiled for the SGP. IDEQ has evaluated beneficial uses for the creek, rating it 2.67 on a scale where a score of 3 or higher indicates that it fully supports macroinvertebrate, fish, and aquatic habitat functioning (IDEQ 2011).

3.23.2.3.3 JOHNSON CREEK

An approximately 2.9-mile segment of Johnson Creek located in BNF MA 21 is eligible for inclusion in the National System, with a preliminary classification of recreational. **Figure 3.23-5** shows its location. The VQO for Recreational WSR segments is partial retention.

This reach of Johnson Creek is eligible for WSR status because of its ORV for cultural (heritage) resources. There are 14 historic sites and 10 prehistoric sites along Johnson Creek (both in and outside of the eligible corridor) that are eligible for listing on the National Register of Historic Places. Heritage resources consist primarily of homesteads and sites associated with the Thunder Mountain gold rush, circa 1900-1904. Two of these sites are Forest Service-administered compounds: Johnson Creek Guard Station, built in the 1920s and Landmark Ranger Station, built in the 1930s by the Civilian Conservation Corps. Fifteen inventoried sites or features are located within the 2.9-mile eligible corridor and contribute to its Heritage ORV (Forest Service 2010).

The existing Idaho Power Company Line 328 (transmission line) was built to service the Stibnite Mine during World War II and is recognized as a contributing Heritage resource under which Johnson Creek is eligible (Forest Service 2013). This transmission line is proposed for replacement with a higher-capacity line as part of the SGP.

Johnson Creek Road (CR 10-413) parallels the eligible recreational segment of Johnson Creek. As discussed in Section 3.16, Access and Transportation, the road is native surfaced and is plowed from the village of Yellow Pine south to Wapiti Meadow Ranch for winter travel. It is groomed for snowmobile use from Wapiti Meadow Ranch to Landmark in winter. Traffic counts showed an annual average daily traffic of 57 vehicles for the summer.

The IDEQ lists Johnson Creek on its 303(d) list of impaired waters, due to temperature (IDEQ 2011). Summer temperatures on Johnson Creek routinely exceed the 10-degree Celsius (50-degrees Fahrenheit) guideline for bull trout spawning.

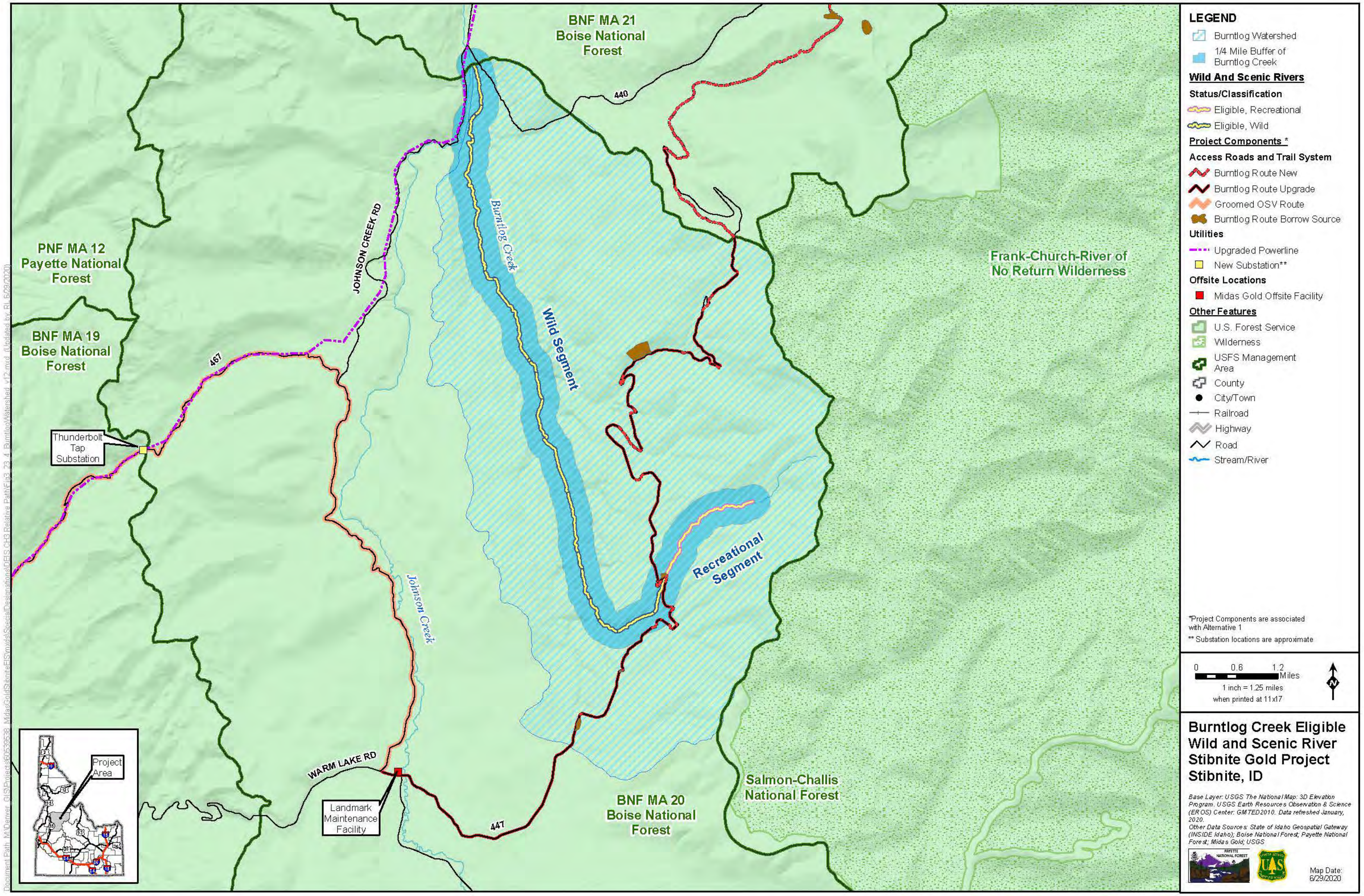

Figure Source: AECOM 2020

Figure 3.23-4 Burntlog Creek Eligible Wild and Scenic River

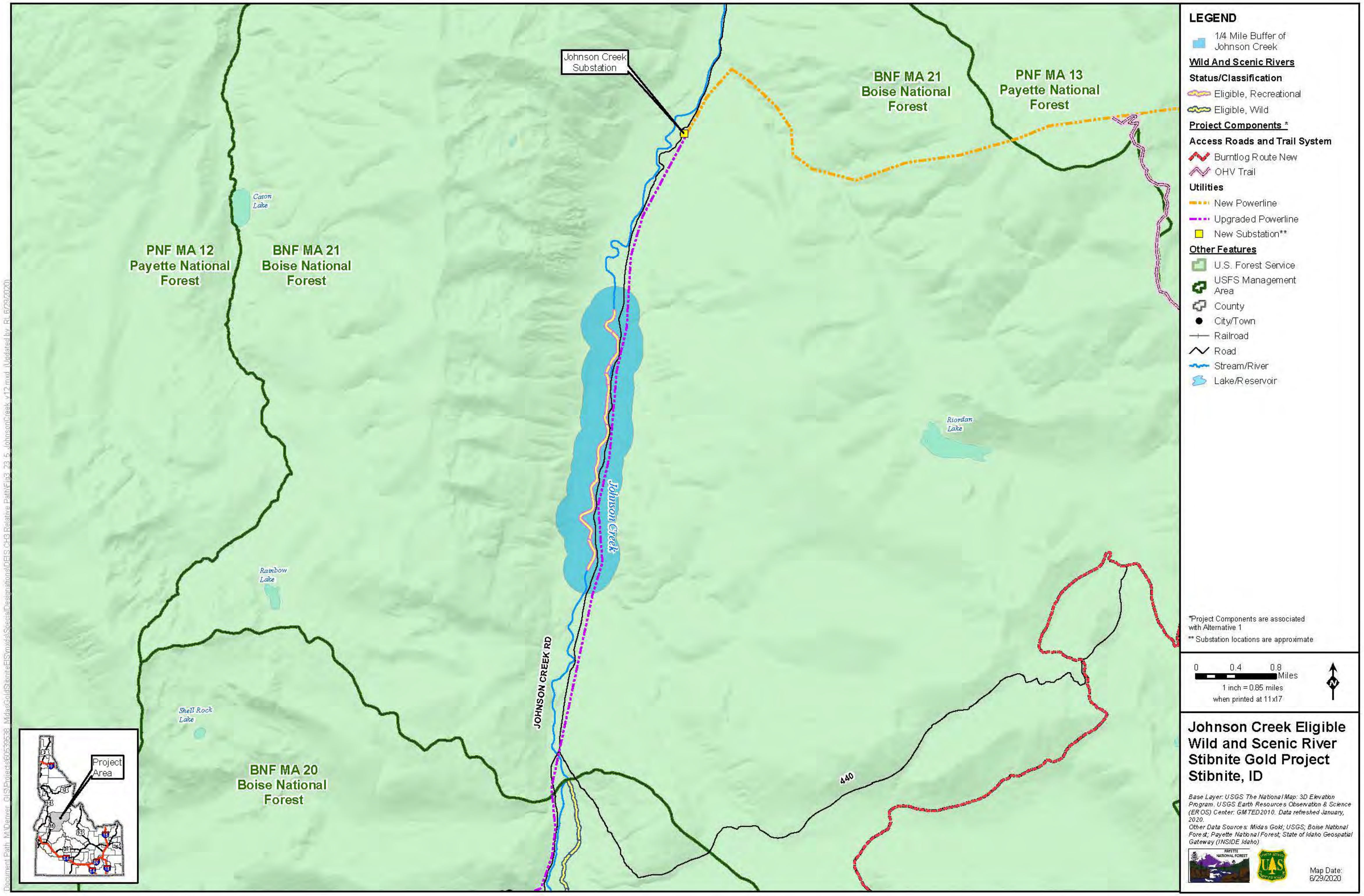

Figure Source: AECOM 2020

Figure 3.23-5 Johnson Creek Eligible Wild and Scenic River

3.23.3 Inventoried Roadless Areas

3.23.3.1 Introduction and Scope of Analysis

Inventoried Roadless Areas (IRAs) refer to undeveloped areas, typically exceeding 5,000 acres, that have been identified and mapped by the Forest Service. IRAs in Idaho are managed under 36 CFR 294, Subpart C - Idaho Roadless Area Management. The analysis area for direct and indirect effects on roadless resources comprises the 13 IRAs and other uninventoried roadless lands[1] within 5 miles of the SGP area. The discussion of roadless areas also includes the roadless portions of six Research Natural Areas (RNAs) and Forest Plan Special Areas within these 13 IRAs.

Figure 3.23-6 shows the five management themes in the 13 IRAs and the land contiguous to unroaded areas. Management themes for Idaho Roadless Areas express a management continuum. The following management classifications are established:

- Wild Land Recreation;
- Special Areas of Historic or Tribal Significance;
- Primitive;
- Backcountry/Restoration; and
- General Forest, Rangeland, and Grassland.

3.23.3.2 Relevant Laws, Regulations, Policies, and Plans

3.23.3.2.1 THE WILDERNESS ACT OF 1964

The Wilderness Act of 1964 (16 USC 1131(note), 1131-1136) gives the statutory definition of wilderness (Section 2[c]), which helps define the evaluation process for potential wilderness in this planning process.

3.23.3.2.2 36 CFR 219.7 SPECIAL DESIGNATIONS

Subpart a of 36 CFR 219.7 Special Designations describes the process for evaluating areas that may be suitable for inclusion in the National Wilderness System, which must be identified as part of the planning process, along with recommendations for wilderness designation. Inventories of lands that may be suitable for inclusion in the National Wilderness Preservation System are conducted following direction in Forest Service Handbook 1909.12—Land

[1] In 1994 and 2008 the 9th Circuit Court of Appeals reaffirmed that the analysis also must encompass uninventoried roadless lands. This analysis must consider the effects on the entire “roadless expanse” (i.e., both the roadless area and any uninventoried roadless lands bounding it) (Smith versus Forest Service, 9th Cir. 1994; Lands Council v. Martin, 9th Cir. 2008).

Management Planning Handbook, Chapter 70 Wilderness, which includes size and road improvement criteria.

3.23.3.2.3 IDAHO ROADLESS RULE

The Idaho Roadless Rule (36 CFR 294 Subpart C) provides state-specific direction for the conservation of inventoried roadless areas in the national forest in the state of Idaho. The Idaho Roadless Rule designated 250 IRAs and established five management themes that provide prohibitions with exceptions or conditioned permissions governing road construction, timber cutting, and mineral development (73 Federal Register 201 [61456-61496]).

3.23.3.2.4 NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

Forest-wide guidelines from the PNF and BNF applicable to the IRAs include non-conforming uses in recommended wilderness areas, review of boundaries of IRAs during project-level planning. The Idaho Roadless Rule authorized administrative corrections to maps to address clerical or typographic errors. PNF and BNF forest-wide standards for IRAs and lands contiguous to unroaded areas provide direction that management actions may only degrade aquatic, terrestrial, and watershed resource conditions for up to 3 years, and there are standards for construction of new roads in Riparian Conservation Areas. The Salmon-Challis National Forest (SCNF) forest-wide standard for wilderness corridors prohibits land-disturbing activities, except legal mineral activity, that would degrade the wilderness characteristics.

3.23.3.3 Existing Conditions

The analysis area contains portions of 13 IRAs identified in the Idaho Roadless Rule. The management themes in the 2008 Idaho Roadless Rule beginning from most to least restrictive are: Wild Land Recreation; Special Areas of Historic or Tribal Significance; Primitive (P); Backcountry Restoration; and General Forest, Range and Grassland. The themes provide an array of permitted and prohibited activities regarding timber cutting, sale, or removal; road construction and reconstruction; and mineral activities. A sixth designation, Forest Plan Special Areas, was used to identify areas managed by forest plans for specific uses, such as Wild and Scenic Rivers, Research Natural Areas, or other specific purposes identified in forest plans. These areas are managed under the Payette Forest Plan (Forest Service 2003) and Boise Forest Plan (Forest Service 2010); the Idaho Roadless Rule does not apply (Forest Service 2008a,b). Section 3.23.2 discusses Wild and Scenic Rivers, and Section 3.23.4 discusses Research Natural Areas.

Table 3.23-6 and **Table 3.23-7** display the acreages in the Idaho Roadless Rule management categories for the portions of the 13 IRAs managed by the PNF and BNF, respectively.

Table 3.23-6 Management Categories of Payette National Forest Inventoried Roadless Areas

Roadless Area Name	Primitive Acres	Wild Land Recreation Acres	Forest Plan Special Area Acres	Backcountry Restoration Acres	Total Acres
Caton Lake	0	0	2,049	43,377	45,426
Horse Heaven	0	0	0	13,446	13,446
Meadow Creek	0	0	0	8,007	8,007
Needles	7,022	90,230	2,534	31,493	131,279
Secesh	7,720	110,255	10,545	119,568	248,088
Sugar Mountain	0	0	0	10,340	10,340
Total	**14,742**	**200,485**	**15,128**	**226,231**	**456,586**

Table Source: Forest Service 2003, 2008a

Table 3.23-7 Management Categories of Boise National Forest Inventoried Roadless Areas

Roadless Area Name	Primitive Acres	Forest Plan Special Area Acres	Backcountry Restoration Acres	General Forest, Rangeland and Grassland Acres	Total Acres
Bernard	0	469	20,422	0	20,891
Black Lake	0	82	5,253	0	5,335
Burnt Log	0	3,837	19,862	0	23,699
Caton Lake	0	177	29,396	9,531	39,104
Horse Heaven	0	0	2,180	2,121	4,301
Meadow Creek	0	149	12,874	8,258	21,281
Needles	5,857	1,185	19,493	56	29,894
Peace Rock	137,429	7,096	47,209	0	191,734
Reeves Creek	0		10,542	0	10,542
Stony Meadows	6,401		7,150	0	13,551
Whiskey	0		4,970	0	4,970
Total	**149,687**	**12,995**	**179,351**	**19,966**	**365,302**

Table Source: Forest Service 2010, 2008a

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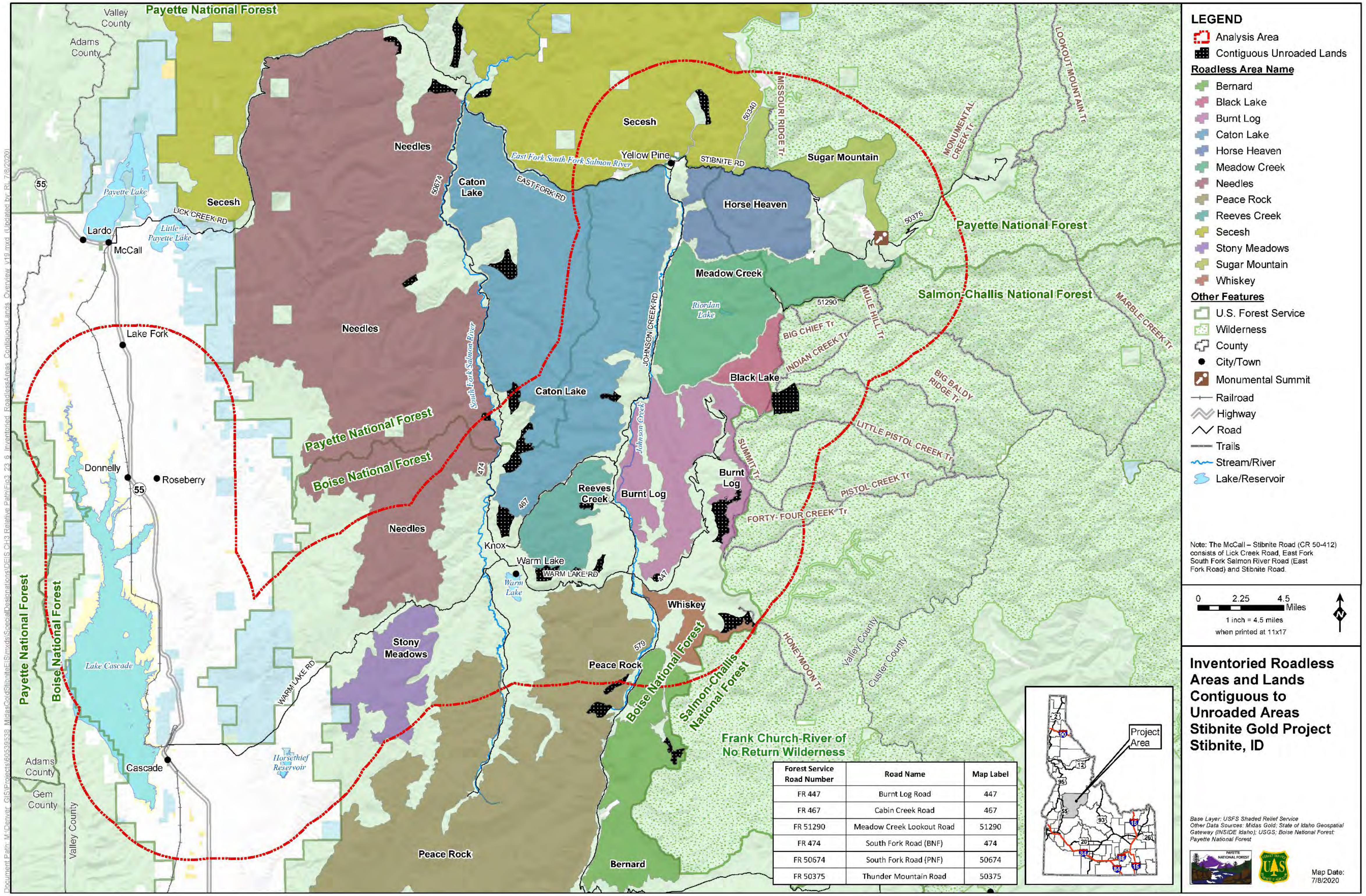

Forest Service Road Number	Road Name	Map Label
FR 447	Burnt Log Road	447
FR 467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR 474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 50375	Thunder Mountain Road	50375

Figure Source: AECOM 2020

Figure 3.23-6 Inventoried Roadless Areas and Lands Contiguous to Unroaded Areas

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Table 3.23-8 lists the IRA management areas and MPCs as administered by the PNF or BNF. The IRAs in the analysis area includes 1,841 acres recommended for wilderness inclusion (MPC 1.2) in the Payette Forest Plan (Forest Service 2003). MPCs for both PNF and BNF are described as follows:

1.2 – Wilderness Inclusion

2.2 – Research Natural Area

3.1 – Passive Restoration and Maintenance of Aquatic, Terrestrial, and Hydrologic Resources

3.2 – Active Restoration and Maintenance of Aquatic, Terrestrial, and Hydrologic Resources

5.1 – Restoration and Maintenance Emphasis within Forested Landscapes

4.2 – Roaded Recreation Emphasis

4.1c – Recreation: Maintain Unroaded Character with Allowance for Restoration Activities

Table 3.23-8 Management Areas and Management Prescription Categories for Inventoried Roadless Areas in the Analysis Area

Forest Area and MA	MPC 1.2 Acres	MPC 2.2 Acres	MPC 3.1 Acres	MPC 3.2 Acres	MPC 5.1 Acres	MPC 4.1c Acres
Payette National Forest MA 13 Big Creek/Stibnite	0	0	37,308	8,021	0	0
Payette National Forest MA 12 South Fork Salmon River	1,841	0	7,392	9,036	0	0
Boise National Forest MA 18 Cascade Reservoir	0	0	0	0	0	3,058
Boise National Forest MA 13 Deadwood River	0	0	30	0	0	0
Boise National Forest MA 21 Lower Johnson Creek	0	808	9,738	25,234	20,177	0
Boise National Forest MA 17 North Fork Payette River	0	0	0	0	0	5,336
Boise National Forest MA 20 Upper Johnson Creek	0	0	52,547	5	0	0
Boise National Forest MA 15 Upper Middle Fork Payette River	0	0	0	0	5	1,659
Boise National Forest MA 19 Warm Lake	0	0	80	37,868	0	0
Total	**1,841**	**808**	**107,095**	**80,164**	**20,182**	**10,053**

Table Source: Forest Service 2003, 2010

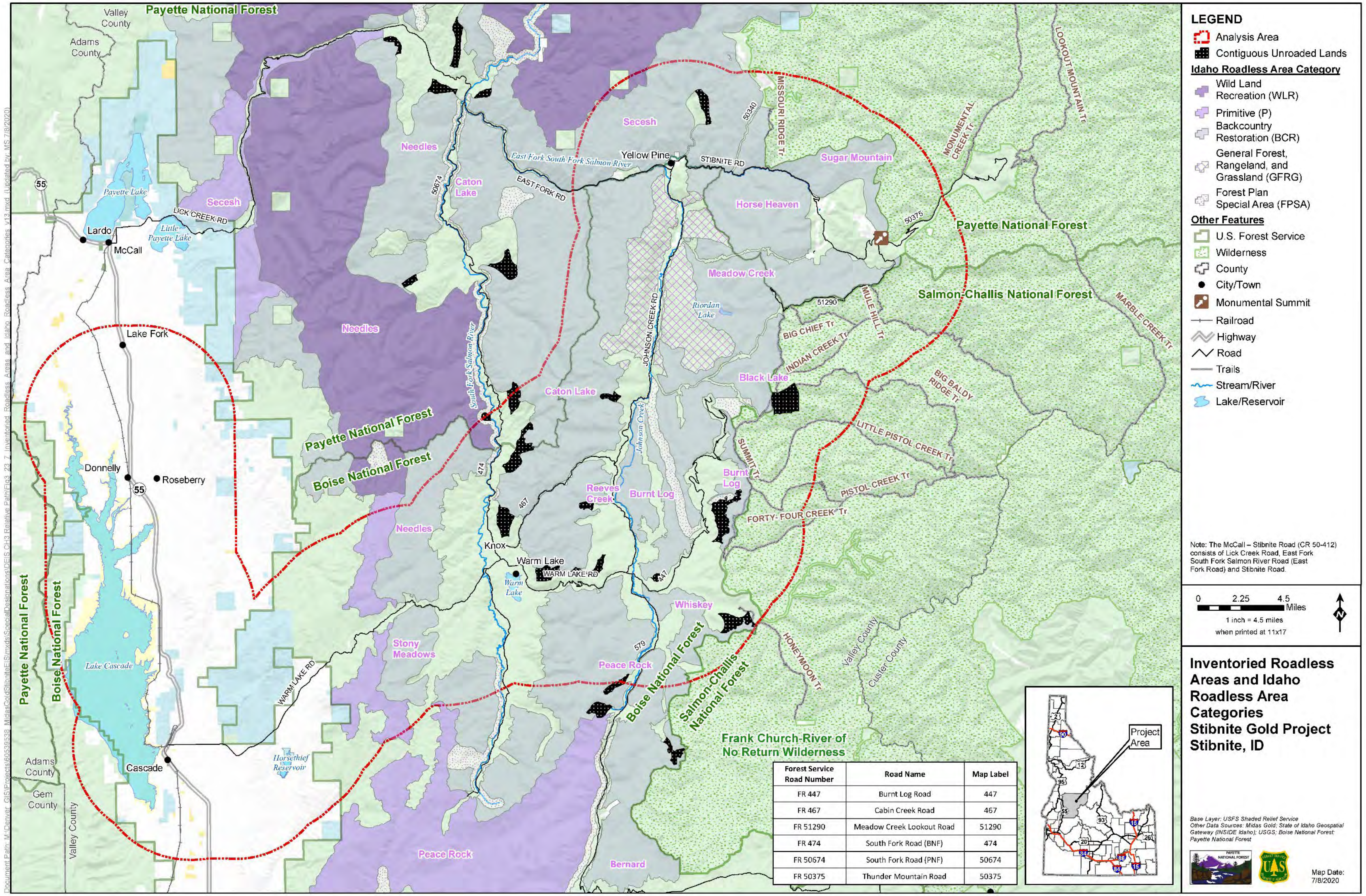
The lands contiguous to unroaded areas are areas with acreages of less than 5,000 acres and are adjacent to an IRA or the FCRNRW boundary (Forest Service 2010). **Table 3.23-9** lists the MPCs for the approximately 9,361 acres of lands in the analysis area that are contiguous to unroaded areas administered by the BNF or the SCNF shown on **Figure 3.23-7**. Lands contiguous to unroaded areas include 882 acres recommended for wilderness inclusion in the Boise Forest Plan (Forest Service 2010) and 1,084 managed as Wilderness Corridor under the 1987 Salmon-Challis Forest Plan.

Table 3.23-9 Management Areas and Management Prescription Categories for Lands Contiguous to Unroaded Areas in the Analysis Area

Forest Area and MA	MPC 1.2 Acres	MPC 3.1 Acres	MPC 3.2 Acre	MPC 4.2 Acres	MPC 5.1 Acres	Wilderness Corridor Acres
Boise National Forest MA 17 North Fork Payette River	0	0	0	0	112	0
Boise National Forest MA 19 Warm Lake	0	0	2,954	592	0	0
Boise National Forest MA 20 Upper Johnson Creek	0	192	2,518	0	0	0
Payette National Forest MA 12 South Fork Salmon River	882	0	2,248	0	0	0
Salmon-Challis National Forest MA 24	0	0	0	0	0	1,084
Total	**882**	**192**	**7,720**	**592**	**112**	**1,084**

Table Source: Forest Service 1987, 2003, 2010

FSH 1909.12, 72.1 discusses the five wilderness attributes identified in the Wilderness Act of 1964. These five wilderness attributes are used to describe the existing conditions in the IRAs and the lands contiguous to unroaded areas (FSH 1909.12-2015 (72.1). An in-depth description of the condition of each of the roadless areas in the forest and the condition and character of each of the areas is further described in the Final Environmental Impact Statement for the Idaho Final Roadless Rule (Forest Service 2008a).



Forest Service Road Number	Road Name	Map Label
FR 447	Burnt Log Road	447
FR 467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR 474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 50375	Thunder Mountain Road	50375

Figure Source: AECOM 2020

Figure 3.23-7 Inventoried Roadless Areas and Idaho Roadless Area Categories

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Table 3.23-10 displays how roadless characteristics are incorporated into the analysis of the effect for wilderness attributes for roadless expanse, which includes the IRAs and the lands contiguous to unroaded areas.

Table 3.23-10 Wilderness Attributes and Corresponding Roadless Area Characteristics

Wilderness Attributes	Roadless Area Characteristic
Natural: Extent to which the area's ecological systems are substantially free from the effects of modern civilization and generally appear to have been affected primarily by forces of nature.	1. High quality or undisturbed soil, water, and air 2. Sources of public drinking water 3. Diversity of plant and animal communities 4. Habitat for threatened, endangered, proposed, candidate, and for sensitive species dependent on large, undisturbed areas of land
Undeveloped: Degree to which the area is without permanent improvements or human habitation.	5. Reference Landscapes: Natural appearing landscapes with high scenic quality
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation **Solitude:** Opportunity to experience isolation from the sights, sounds, and presence of others from the development and evidence of humans. **Primitive and unconfined recreation:** Opportunity to experience isolation from the evidence of humans, to feel a part of nature, to have a vastness of scale, and a degree of challenge and risk while using outdoor skills	6. Primitive, semi-primitive non-motorized, semi-primitive motorized recreation opportunity spectrum (ROS) classes of dispersed recreation
Special Features: Unique and/or special geological, biological, ecological, cultural, or scenic features.	7. Traditional cultural properties and sacred sites 8. Other locally identified unique characteristics
Manageability: Ability of the Forest Service to manage an area to meet size criteria and the elements of wilderness.	No criteria[1]

Table Source: FSH 1909.12 (72.1); Landres et al. 2008

Table Notes:

1 Idaho Roadless Areas typically exceed 5,000 acres to meet the minimum criteria for consideration for inclusion in the National Wilderness Preservation System.

3.23.3.3.1 NATURAL INTEGRITY AND APPEARANCE

The natural integrity and appearance of the 13 IRAs and lands contiguous to unroaded areas (roadless expanse) are generally undisturbed from natural conditions and unaffected by human development, which is substantially unnoticeable. However, there are an estimated 32.5 miles of unauthorized roads in the IRA analysis area.

The natural appearance in the roadless expanse has been influenced by past mining activities, road intrusions, and telephone (i.e. utility) infrastructure corridors. **Table 3.23-11** contains a description of the natural integrity and appearance of the 13 IRAs and contiguous lands. There are an estimated 5.4 miles of designated NFS roads and 531 miles of trails that allow motorized use in the roadless expanse. During winter, there are groomed over-snow vehicle routes on roads adjacent to the boundary of the roadless expanse.

Table 3.23-11 Natural Integrity and Appearance of Inventoried Roadless Areas and Contiguous Land

Roadless Area Name	Natural Integrity and Appearance
Bernard	There is approximately 0.1 mile of NFS roads in the IRA, and historic mining sites have been located along the Deadwood River. There are 21 mining claims in the IRA.
Black Lake Includes 793 acres of contiguous lands	The integrity of the area has been affected in some locations by historic mining activity.
Burnt Log Includes 1,087 acres of contiguous lands	There are approximately 12 miles of NFS roads and 14 miles of trails open to motorized use in the IRA.
Caton Lake Includes 2,979 acres of contiguous lands	There are approximately 40 miles of trails open to motorized use in the IRA, and there are an estimated 1.25 miles of unauthorized roads within the IRA boundary.
Horse Heaven	There are approximately 0.2 mile of NFS roads and 40 miles of trails open to motorized use in the IRA boundary.
Meadow Creek	There are an estimated 15 miles of trails open to motorized use and 2.9 miles of NFS roads within the IRA boundary. Surrounding and intruding roads, a telephone infrastructure corridor, and scattered mining claims detract from the natural integrity in some portions of the area.
Needles Includes 2,327 acres of contiguous lands	There are an estimated 132 miles of trails open to motorized use and 0.1 mile of NFS roads within the IRA boundary. There also are an estimated 30 miles of unauthorized roads in the IRA.
Peace Rock Includes 1,363 acres of contiguous lands	There are approximately 131 miles of trails open to motorized use and 0.3 mile of NFS roads within the IRA boundary. During winter, there is a groomed over-snow vehicle route along the north and east side of the IRA.
Reeves Creek Includes 788 acres of contiguous lands	There are approximately 0.2 mile of NFS roads and 20 mining claims within the IRA boundary.
Secech Includes 275 acres of contiguous lands	There are an estimated 0.8 mile of NFS roads and Valley County roads within the boundary and 194 miles of trails open to motorized use. Past mining activity occurred in Ruby and Willow Basket creeks and around Secesh Meadows.
Stony Meadows Includes 112 acres of contiguous lands	There are approximately 5.4 miles of trails open to motorized use, and, during the winter, there is a plowed road on the north side of the IRA and a groomed snowmobile trail along the east side.
Sugar Mountain	An estimated 1.1 miles of unauthorized roads are within the IRA boundary, and 1 mile of the trail is open to motorized use.
Whiskey Includes 588 acres of contiguous lands	There are 1.5 miles of trails open to motorized use and approximately 0.2 mile of NFS roads in the IRA.

Table Source: Forest Service 2008a

Table Notes:

The specific miles for roads and trails are from Final Idaho Roadless Area Environmental Impact Statement Volume 4 Appendix C Boise, Payette, and Sawtooth.

3.23.3.3.2 OUTSTANDING OPPORTUNITIES FOR SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION

The 13 IRAs, including the adjacent unroaded areas, provide recreation opportunities, such as camping, canoeing, cross-country skiing, fishing, hiking, hunting, picnicking, and wildlife viewing. The outstanding opportunities for solitude or primitive and unconfined recreation vary throughout the roadless expanse. Outstanding opportunities for solitude are high in areas of the roadless expanse due to the topography, vegetation, and distance to large population centers. Opportunities for solitude are good in the Meadow Creek IRA around Riordan Lake, which is sheltered by extensive vegetation and small draws. However, in the areas where the roadless expanse is adjacent to heavily used access roads and trails that allow motorized use, the outstanding opportunities for solitude are limited. Opportunities for solitude are limited in some areas due to the loss of vegetative screening from past wildfires. In areas of the roadless expanse that are narrower than 1 mile, the irregular and complex shape limits opportunities for solitude.

The topography and climate in the roadless expanse provide opportunities for primitive and challenging recreational activities. Except for motorcycle or all-terrain vehicle recreation, most existing recreation use is of a primitive type (e.g., hiking, backpacking, stock use and trail riding, big and small game hunting, and primitive recreation). Locations where the roadless expanse is narrow, and there are cherry-stemmed road exclusions, limit opportunities for primitive recreation.

The physical setting of the ROS class is defined by the absence or presence of human sights and sounds, physical size of an area, and the amount of environmental modification caused by human activity (Forest Service 1982; Johnson et al. 2005). Section 3.19, Recreation, discusses summer and winter ROS classes in more detail.

Table 3.23-12 and **Table 3.23-13** provide estimates of the physical setting ROS acres in the roadless expanse during summer and winter. During summer, 129,437 acres of the roadless expanse in the analysis area meet the semi- primitive non-motorized setting and provide visitors a high probability of getting away from the sights and sounds of other people. A total of 45,000 acres of the roadless expanse meet the semi-primitive motorized setting during summer, providing visitors with a moderate probability of getting away from sights and sounds of other people.

Table 3.23-12 Inventoried Roadless Areas and Lands Contiguous to Unroaded Areas Summer Recreation Opportunity Spectrum

Roadless Area Name	Rural Acres	Roaded Natural Acres	Semi-Primitive Motorized Acres	Semi-Primitive Non-Motorized Acres
Bernard	701	1,119	0	233
Black Lake Includes 1,084 acres of contiguous lands	0	3,367	315	3,821
Burnt Log Includes 1,087 acres of contiguous lands	618	11,771	5,040	7,357
Caton Lake Includes 854 acres of contiguous lands	2,280	5,339	5,361	37,891
Horse Heaven	2,737	1,559	713	12,738
Meadow Creek	296	7,702	7,219	13,996
Needles Includes 66 acres of contiguous lands	1,276	1,517	4,940	11,449
Peace Rock Includes 60 acres of contiguous lands	2,149	1,835	7,565	8,788
Reeves Creek Includes 2,021 acres of contiguous lands	620	4,032	143	7,767
Secech Includes 401 acres of contiguous lands	4,218	2,181	10,374	10,468
Stony Meadows	1,781	2,866	1,930	6,693
Sugar Mountain	2,456	1,472	551	5,861
Whiskey Includes 612 acres of contiguous lands	792	1,537	849	2,375
Total	**19,924**	**46,297**	**45,000**	**129,437**

Table Source: Forest Service 2003, 2008a

During winter, 140,991 acres of the roadless expanse in the analysis area meet the semi-primitive non-motorized setting and 40 acres meet the primitive setting. These areas provide visitors with a high probability of getting away from the sights and sounds of other people. There are 11,496 acres of the roadless expanse that meet the semi-primitive motorized groomed setting and 85,244 acres that meet the semi-primitive motorized setting during winter, providing visitors with a moderate probability of getting away from sights and sounds of other people.

Table 3.23-13 Inventoried Roadless Areas and Lands Contiguous to Unroaded Areas Winter Recreation Opportunity Spectrum

Roadless Area Name	Rural Acres	Roaded Natural Acres	Semi-Primitive Motorized Acres	Semi-Primitive Motorized Groomed Acres	Semi-Primitive Non-Motorized Acres	Primitive Acres
Bernard	0	0	1,517	1,205	536	0
Black Lake Includes 1,084 acres of contiguous lands	0	0	2,598	0	3,821	0
Burnt Log Includes 1,087 acres of contiguous lands	0	0	15,827	3,935	8,958	0
Caton Lake Includes 854 acres of contiguous lands	2,971	0	6,517	938	41,383	0
Horse Heaven	539	2,460	3,549	0	11,200	0
Meadow Creek	1,110	100	14,423	599	13,580	0
Needles Includes 66 acres of contiguous lands	1,274	0	5,876	0	12,032	0
Peace Rock Includes 60 acres of contiguous lands	0	0	10,233	2,169	10,103	0
Reeves Creek Includes 2,021 acres of contiguous lands	519	0	4,131	267	7,767	0
Secech Includes 401 acres of contiguous lands	1,455	1,018	10,759	0	14,009	0
Stony Meadows	795	0	5,756	981	6,729	0
Sugar Mountain	0	1,535	274	0	8,491	40
Whiskey Includes 612 acres of contiguous lands	0	0	3,784	1,402	2,382	0
Total	**8,663**	**5,113**	**85,244**	**11,496**	**140,991**	**40**

Table Source: Forest Service 2003, 2008a

3.23.3.3.3 SPECIAL FEATURES

In each of the 13 IRAs, there are locally identified unique characteristics and values. These special features include areas valued for their scientific qualities, scenic qualities, or other notable distinct features. **Table 3.23-14** describes special features identified for the IRAs in the analysis area, including areas where habitat modeling indicates special status plant species occur, as shown in **Appendix H1-H3**.

Table 3.23-14 Inventoried Roadless Areas and Lands Contiguous to Unroaded Areas Special Features

Roadless Area Name	Special Features
Bernard	No special features identified.
Black Lake Includes 793 acres of contiguous lands	A total of 82 acres of the 1,290-acre Chilcoot Peak RNA are in this IRA. Habitat modeling indicates 19 special status plant species may be found in this area.
Burnt Log Includes 1,087 acres of contiguous lands	A total of 700 acres of the 1,290-acre Chilcoot Peak RNA are in this IRA. A total of 3,100 acres of the Burnt Log Creek corridor, which is eligible for Wild and Scenic River designation, bisects the IRA. Habitat modeling indicates 22 special status plant species may be found in this area.
Caton Lake Includes 2,979 acres of contiguous lands	Caton Lake and other alpine lakes are special features, along with the 1,100-acre Phoebe Meadows RNA. Habitat modeling indicates 18 special status plant species may be found in this area.
Horse Heaven	An elk security area, which is analogous to elk winter range, lies in the north end of the IRA. Habitat modeling indicates 28 special status plant species may be found in this area.
Meadow Creek	Riordan Lake, Meadow Creek Lookout, and about 100 acres of the Johnson Creek Wild and Scenic River eligible corridor are special features in this IRA. Habitat modeling indicates 25 special status plant species may be found in this area.
Needles Includes 2,327 acres of contiguous lands	The Needles geologic formation, a scenic landmark, and the 985-acre Needles RNA are in the IRA. Habitat modeling indicates three special status plant species may be found within this area.
Peace Rock Includes 1,363 acres of contiguous lands	About 1,300 acres of Back Creek RNA are located in the IRA. Habitat modeling indicates four special status plant species may be found in this area.
Reeves Creek	Habitat modeling indicates 22 special status plant species may be found in the area.
Secech Includes 275 acres of contiguous lands	Elk winter range occurs along the East Fork South Fork Salmon River and along the South Fork Salmon River in this IRA, and 1,464 acres include the Circle End Creek RNA. Approximately 700 acres are part of the Yellow Pine Water Users watershed. Habitat modeling indicates 17 special status plant species may be found in this area.
Stony Meadows Includes 112 acres of contiguous lands	Curtis Lake is a high elevation lake of special interest. Habitat modeling indicates two special status plant species may be found in this area.
Sugar Mountain	Sugar Mountain and Missouri Ridge are prominent landmarks. A big game migration route passes near Sugar Mountain. Habitat modeling indicates 15 special status plant species may be found in this area.
Whiskey	Habitat modeling indicates 11 special status plant species may be found in this area.

Table Source: AECOM 2020; Forest Service 2008a

3.23.3.3.4 MANAGEABILITY

Manageability refers to the ability to manage an area to maintain roadless characteristics. A total of 2,723 acres in the analysis area of Needles and Secesh IRAs are recommended for wilderness in the Payette Forest Plan (Forest Service 2003) and Boise Forest Plan (Forest Service 2010). Areas of the roadless expanse with complex and irregular boundaries from intersecting roads or private lands and small IRA areas make it more difficult to define and administer the area to maintain roadless characteristics. In addition, boundaries for parts of IRAs in the roadless expanse are difficult to identify on the ground and difficult to administer due to their remoteness. **Table 3.23-15** describes the manageability of the roadless expanse for each of the 13 IRAs and the contiguous unroaded area.

Table 3.23-15 Inventoried Roadless Areas and Lands Contiguous to Unroaded Areas Manageability

Roadless Area Name	Manageability
Bernard Includes 306 acres of contiguous lands	Bernard IRA has some very complex and irregular boundaries due to the long exclusion of the road along Sulphur Creek.
Black Lake Includes 1,084 acres of contiguous lands	Black Lake IRA is less than 5,000 acres.
Burnt Log Includes 909 acres of contiguous lands	Burnt Log IRA has very complex and irregular boundaries.
Caton Lake Includes 989 acres of contiguous lands	Caton Lake IRA is relatively intact with defined boundaries.
Horse Heaven	Mining development inclusions complicate managing the area.
Meadow Creek	Portions of Meadow Creek IRA have easily defined boundaries.
Needles Includes 1,506 acres of contiguous lands	The Needles IRA has some irregular boundaries.
Peace Rock Includes 645 acres of contiguous lands	Peace Rock IRA has very complex and irregular boundaries.
Reeves Creek Includes 2,021 acres of contiguous lands	Reeves Creek IRA has some irregular boundaries.
Secech Includes 1,110 acres of contiguous lands	Secesh IRA is relatively intact with defined boundaries.
Stony Meadows	Stoney Meadows IRA has some irregular boundaries.
Sugar Mountain	Sugar Mountain IRA has boundaries that may be difficult to manage due to past or future mining activity.
Whiskey Includes 613 acres of contiguous lands	Whiskey IRA has very complex and irregular boundaries.

Table Source: Forest Service 2003, 2008a, 2019

3.23.4 Research Natural Areas

3.23.4.1 Introduction and Scope of Analysis

RNA are tracts of land or water that support high quality examples of terrestrial or aquatic ecosystems, habitats, or populations of rare or endangered plant or animal species; or support unique geological study of the features. RNAs are managed in a way that allows natural processes to predominate, with minimal human intervention. The analysis area for RNAs are the RNAs that are within 5 miles of proposed SGP facilities. There are six RNAs in the analysis area: Back Creek, Belvidere Creek, Chilcoot Peak, Circle End Creek, Needles, and Phoebe Meadows (**Figure 3.23-8**).

3.23.4.2 Relevant Laws, Regulations, Policies, and Plans

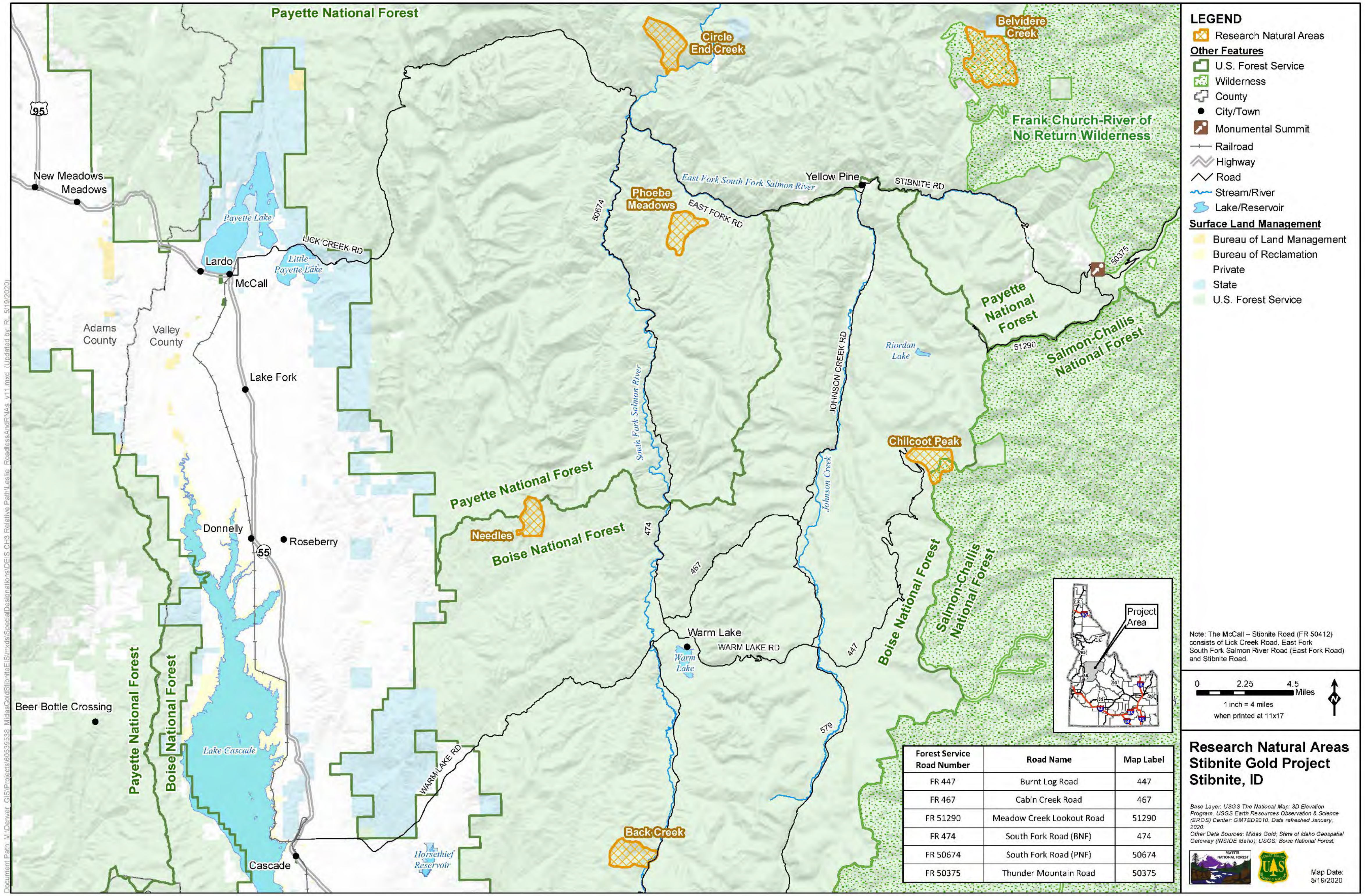
3.23.4.2.1 ORGANIC ADMINISTRATION ACT OF 1897

The general provisions of the Organic Administration Act of 1897 (16 USC 551) authorize the Secretary of Agriculture to designate RNAs. Under regulations at 7 CFR 2.60(a), the Secretary has delegated this authority to the chief of the Forest Service, who, pursuant to 36 CFR 251.23, selects and establishes RNAs as part of the continuing land and resource management planning process for NFS lands (36 CFR 219.7 and Forest Service Manual [FSM] 1922).

3.23.4.2.2 FOREST SERVICE MANUAL 4000 RESEARCH AND DEVELOPMENT, CHAPTER 4060

Chapter 4060 of FSM 4000 provides direction for RNA management as part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on NFS lands. RNAs are managed for nonmanipulative research, observation, and study. The establishment of RNAs emerges from continuing land and resource management planning and associated environmental analyses (FSM 1920 and FSM 1950).

An establishment record, indicating the purpose of establishment and description of land and resource values, is required for each RNA. The establishment records for the RNAs restrict management activities that disturb or modify the environment; prohibit livestock grazing, prescribed fire except under a future fire management plan, fuelwood and timber cutting; and withdraw the areas from mineral entry. The establishment records direct that recreational use be monitored for undesired impacts and that recreation be restricted, if deemed necessary, based on future RNA monitoring (Forest Service 1995, 1996a-f). FSM 4063.3(5) directs that recreation be “restricted or prohibited if such use threatens or interferes with the objectives or purpose for which the [RNA] is established.”



Forest Service Road Number	Road Name	Map Label
FR 447	Burnt Log Road	447
FR 467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR 474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 50375	Thunder Mountain Road	50375

Figure Source: AECOM 2020

Figure 3.23-8 Research Natural Areas

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3.23.4.2.3 NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

The 2003 Payette Forest Plan and 2010 Boise Forest Plan describe desired future conditions in RNAs. The desired condition for RNAs for both the Payette Forest Plan and the Boise Forest Plan is:

> *Research Natural Areas (RNAs) are areas where ecological processes generally prevail. They remain largely undisturbed by human uses or activities, and provide quality opportunities for non-manipulative scientific research, monitoring, observation, and study. The RNA network provides examples of representative forest habitats, shrublands, wetlands, riparian systems, grasslands, geologic formations, wildlife habitats, and aquatic communities. Management plans have been developed and implemented for all areas.*

3.23.4.3 Existing Conditions

The system of RNAs was established with the goal of allowing natural processes to occur without the influence of human activity. RNAs preserve natural features and plant communities for research and educational purposes. The objectives of RNAs are:

- to provide baseline areas against which the effects of human activities in similar environments can be measured;
- to provide sites for study of natural processes in undisturbed ecosystems; and
- to provide gene pool preserves for plant and animal species (Rust 1998).

RNAs contribute to a national network of ecological areas dedicated to research, education, and the maintenance of biological diversity. These conditions are ordinarily achieved by allowing natural, physical and biological processes to prevail without human intervention. RNAs that are representative of common ecosystems in natural conditions serve as baseline or reference areas. The six RNAs in the analysis area provide on-site and extension educational opportunities (**Table 3.23-16**).

Table 3.23-16 Research Natural Areas in the Analysis Area

RNA	Forest	Management Area	Acres	Elevation in Feet
Back Creek	BNF	MA 19 Warm Lake	1,368	6,200–8,922
Belvidere Creek	PNF	MA 14 Frank Church River of No Return Wilderness	2,920	6,200–9,273
Chilcoot Peak	BNF	MA 21 Lower Johnson Creek	1,294	7,250–8,998
Circle End Creek	PNF	MA 12 South Fork Salmon River	1,464	3,551–7,769
Needles	BNF	MA 18 Cascade Reservoir	985	6,750–8,880
Phoebe Meadows	PNF	MA 12 South Fork Salmon River	1,256	6,100–7,400

Table Source: Forest Service 2017

Table Notes:

1 Size for each RNA is based on GIS data from the PNF and BNF.

The following list is a summary of the resources for which each of the six RNAs were established. Complete descriptions of the RNAs are found in the establishment records (Forest Service 1995, 1996a-f). Fire is an ecosystem process within these RNAs and is consistent with the values for which they are established. No formal studies have been conducted documenting if characteristic versus uncharacteristic fire has occurred; the evidence is based on field observations and indicates primarily characteristic fire behavior.

- Back Creek RNA was established to preserve diverse, high-quality streamside meadows, numerous subalpine fir habitat types, and rare lodgepole pine/Idaho fescue (*Pinus contorta*/*Festuca idahoensis*) habitat types. This RNA encompasses the entire watershed of a tributary to the South Fork Salmon River. Elevations in the RNA range from about 6,200 feet at the juncture of the South Fork Salmon River with the northern boundary of the RNA to 8,922 feet at a peak along the drainage divide forming the northern boundary. The RNA contains a diversity of subalpine fir habitat types ranging from wet to dry site types. Wetland complexes, including graminoid meadows, sphagnum fen, and wet-site forest, are interspersed among the subalpine fir types. Second and third order streams in the RNA support a diverse assemblage of aquatic flora and fauna. The South Fork Salmon River, about one mile of which flows through the RNA, is considered critical habitat for the spring and summer runs of Chinook salmon (*Oncorhynchus tschawytscha*). The upper South Fork and its tributaries provide spawning habitat for bull trout (*Salvelinus confluentus*) as well.
- Belvidere Creek RNA was established to preserve high elevation subalpine fir habitat types, outstanding aquatic features with associated wetland plant communities, and a unique and scenic geomorphic setting. This RNA encompasses an entire watershed that was glacially sculptured during the Pleistocene. A complex system of tributaries makes up the headwaters of Belvidere Creek, including nine cirque and paternoster (chain of lakes) lakes. The tributaries coalesce as they enter the straight, U-shaped lower valley. A small area of mountain big sagebrush/Idaho fescue habitat type occurs in the lower valley below an avalanche chute. Whitebark pine-subalpine fir habitat types and open scree slopes occur on the upper elevation ridges. Fire rings and litter in portions of the RNA show evidence of recreation use. Overall, no major changes in the extent of cover types have been confirmed since RNA establishment.
- Chilcoot Peak RNA was established to preserve diverse subalpine forest habitats, including subalpine fir, Douglas-fir, and whitebark pine (*Pinus albicaulis*) habitat types. The glaciated basins below Chilcoot Peak support an unusually diverse assemblage of wetland and aquatic associations, including a high elevation lake, raised ponds with sphagnum, wet meadows, and gentle- to steep-gradient stream reaches. This RNA encompasses three subalpine, glaciated basins and intervening ridgeline habitats. The basins contain an unusually diverse assemblage of wetland and aquatic associations. Aquatic types include a lake, raised ponds with sphagnum, and low- to steep-gradient streams. The raised ponds are dominated by water lily (*Nuphar polysepalum*). Wetland associations are dominated by coniferous tree, shrub, and graminoid species, often occurring on sphagnum. Engelmann spruce (*Picea engelmannii*) occurs as small islands

on the sphagnum mats, with Labrador tea (*Ledum glandulosum*) and western blueberry (*Vaccinium occidentale*) in the understory. Shrub communities include those dominated by Sitka alder (*Alnus sinuata*) and undergreen willow (*Salix commutata*). Graminoid associations include water sedge (Carex aquatilis), beaked sedge (*Carex rostrata*), and few-flowered spike-rush (*Eleocharis pauciflora*). Dry subalpine fir and whitebark pine (*Pinus albicaulis*) associations dominate the uplands, with inclusions of cliff, talus, and rock outcrop habitats around Chilcoot Peak. The Forest Service's 2015 monitoring report indicates the last 0.25 to 0.5 mile of Burnt Log Road (FR 447) through the RNA is not accessible with a full-size vehicle.

- Circle End Creek contains nine forested habitat types and significantly enhances the representation of these elements in Idaho's RNA system. This RNA encompasses the entire Circle End Creek drainage, a steep tributary of the South Fork Salmon River. Circle End drainage includes three coniferous forest habitat type series: ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and subalpine fir. Four ponderosa pine habitat types occur in the lower end of the drainage. Two Douglas-fir and one subalpine fir habitat types occur on moist slopes, largely at the upper elevations. The steep gradient and geologically unstable substrate comprising the Circle End Creek drainage contains several montane forest habitat types and provides a benchmark for erosion and sedimentation studies within the South Fork Salmon River drainage. During a 2010 site visit, Forest Service staff observed the presence of non-native plants and noxious weed species along Hamilton Bar Road (FR 50673) and South Fork Salmon River East Road (Forest Road System Trail 0076) on the border of the RNA. Fire rings and litter in portions of the RNA show evidence of recreation use.
- Needles RNA was established to preserve high-elevation subalpine fir habitat types, outstanding aquatic features with associated wetland plant communities, and its unique geomorphic setting. Whitebark pine and Douglas-fir habitat types also are represented. Both forested and non-forested vegetation types are in good condition due to the remoteness of the area and absence of livestock grazing. This RNA encompasses the headwaters of a perennial tributary to the North Fork Gold Fork River and includes a high-elevation glacial cirque occurring on granitic rocks of the Idaho Batholith. The watershed is surrounded on three sides by ridges of bare rock topped in places by granite monoliths, some of which are up to 50 feet tall. The RNA derives its name from a summit in the southwest corner, which is topped by such monoliths. A large portion of the area is exposed granite bedrock supporting little vegetative cover. The RNA supports at least nine subalpine fir habitat types. Slopes surrounding the basin are dominated by exposed granite with very open stands and stringers of Engelmann spruce (*Picea engelmannii*), subalpine fir, and whitebark pine. The Douglas-fir/elk sedge (*Pseudotsuga menziesii/Carex geyeri*) habitat type occurs on dry sites at the lowest elevations. Small inclusions of Sitka alder (*Alnus sinuata*) glades occur on forested slopes. The upper basin is fed by numerous springs, resulting in extensive sedge (*Carex* spp.) meadows surrounding a shallow lake. Forest Service monitoring in 2013 indicated the RNA is mostly undisturbed, except for a small amount of fire and evidence of dispersed

camping. Past disturbance within the RNA includes felling trees around ponds to facilitate helicopter dipping.

- Phoebe Meadows RNA was established to protect a large variety of subalpine fir and Douglas-fir forest types and diverse mountain meadow systems and associated aquatic features. This RNA is situated in a granitic, montane basin that forms the headwaters of Phoebe Creek, a tributary of the South Fork Salmon River. The fluvial basin is formed from granitic bedrock and dissected by a network of streams that feed an extensive system of wet meadows on the floor of the basin. These wetlands support a small pond, sedge meadow (*Carex spp*.), cotton grass (*Eriophorum polystachion*), Sphagnum mat, and riparian shrub communities. Upland areas within the basin support examples (in various successional stages) of Douglas-fir and grand fir series habitat types, an unusual lodgepole pine (*Pinus contorta*) habitat type, and a particularly diverse representation of at least eight subalpine fir habitat types. Forest types in the Douglas-fir series are dominated by ponderosa pine (*Pinus ponderosa*), individuals of which occur all the way up Indian Ridge at the northern boundary of the site. During a 2009 site visit, Forest Service staff noted portions of Phoebe Meadows Road (Forest Road System Trail 291) are deeply rutted due to erosion resulting from capture of stormwater runoff. In addition, braided user-created trails within the wet meadows have caused rutting by trail users.

3.24 Tribal Rights and Interests

3.24.1 Introduction and Scope of Analysis

This analysis considers the rights and interests of federally-recognized American Indian Tribes (the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes [Tribes]) whose traditional subsistence range (or "traditional use area," meaning, geographic areas commonly used for the provision of food, clothing, shelter, spiritual, and other purposes) includes the Stibnite Gold Project (SGP) area to determine the extent that tribal members would experience adverse effects to their tribal rights and interests as a result of the SGP. These tribes are represented by the Nez Perce Reservation, the Fort Hall Reservation (reservation of the Shoshone-Bannock Tribes), and the Duck Valley Reservation (reservation of the Shoshone-Paiute Tribes). The locations of the current reservations are shown on **Figure 3.21-2**, Census Tracts and Tribal Reservations in the Analysis Area**,** in Section 3.21, Social and Economic Conditions.

"Tribal rights" refer to rights legally accruing to a tribe by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order (EO), or agreement, and which give rise to legally enforceable remedies. "Tribal resources" is defined as natural resources retained by, or reserved by or for Indian tribes through treaties, statutes, judicial decisions, executive order, or agreement and that are protected by a fiduciary obligation on the part of the United States. In this Environmental Impact Statement, tribal resources include the traditional fish, wildlife, and plants of importance to ancestral and modern descendant tribes, as well as the areas, sites, or waterways that have or support such resources. Tribal resources also include sacred sites used for spiritual and religious activities, traditional cultural properties, and cultural landscapes. Traditional cultural properties and cultural landscapes, defined as historic properties eligible for listing in the National Register of Historic Places under the National Historic Preservation Act (Parker and King 1998), also are addressed in Section 3.17, Cultural Resources. "Interests" is used herein to refer to the concerns that individual tribes express in activities that can affect the landscape and resources within their traditional subsistence range. "Treaty tribes" refers to those tribes who negotiated a treaty with the federal government that was subsequently ratified by the U.S. Senate. "Federally recognized" refers to those tribes who received federal recognition status through treaties, acts of Congress, presidential executive orders, other federal administrative actions, or federal court decisions (Bureau of Indian Affairs 2020).

The analysis area for tribal rights and interests is the geographic area within which the SGP may directly or indirectly cause alterations in the character of tribal resources and in a tribe's ability to exercise their rights for off-reservation tribal fishing, hunting, gathering, and pasturing activities and ability to practice spiritual and religious activities that also are protected under federal laws. The analysis area for tribal rights and resources includes the South Fork Salmon River (SFSR) watershed (**Figure 3.24-1**). The watershed was selected as the analysis area, because it encompasses (is larger than or equal in size to) the other analysis areas used in this

EIS for tribal resources of concern including fish and fish habitat, wildlife and wildlife habitat, vegetation and botanical resources, and cultural resources that may be directly or indirectly impacted by the SGP.

3.24.2 Relevant Laws, Regulations, Policies, and Plans

This section provides a summary of select federal treaties, laws, EOs, court decisions, and U.S. Forest Service (Forest Service) Land and Resource Management Plans applicable to tribal rights and interests as they relate to the SGP.

The interests of the Nez Perce Tribe, the Shoshone-Bannock Tribes, and the Shoshone-Paiute Tribes go beyond spiritual, cultural, and economic to the unique legal relationship that the U.S. Government has with American Indian tribal governments and the U.S. Government's trust responsibility (Forest Service Manual 1563.1b(1), Forest Service Manual 1563.8(b)). Federally recognized tribes are sovereign nations who work with the federal government, and its agencies, through the process of government-to-government consultation. The federal trust relationship with each tribe was recognized by, and has been addressed through, the U.S. Constitution, treaties, EOs, statutes, and court decisions. In general, these mandates protect and enhance the ability of the tribes to exercise rights and cultural practices off-reservation. Cultural interests and uses on National Forest System (NFS) lands are protected through various federal statutes. The federal trust requires federal agencies to manage the lands under their stewardship with full consideration of tribal rights and interests, particularly reserved rights, where they have been exercised since time immemorial.

Many of the treaties and EOs signed by the U. S. government in the mid-1800s reserved homelands for the tribes. Additionally, the treaties with the Nez Perce Tribe and Shoshone-Bannock Tribes reserved certain rights outside the established reservations, such as fishing, hunting, plant gathering, and pasturing, including on what are now NFS land. Tribes still protect and exercise those rights throughout the analysis area.

Tribal rights and trust responsibilities are accorded equal status with federal statutes that supersede State laws, including State constitutions. These rights are protected because they were settled upon by government-to-government agreement or as defined by statute or court decision. The federal trust doctrine was first described by the Supreme Court in Cherokee Nation v. The State of Georgia 30 U.S. (5 Pet.) 1 (1831). The Secretary of the Interior has specific trust-holding responsibilities not delegated to any other U.S. government department or agency. That federal trust responsibility is based upon a holding of assets such as land. The Department of the Interior's Office of American Indian Trust has defined the relationship to include the protection of treaty rights. The Forest Service obligations include management of NFS lands consistent with other federal laws and the protection of off-reservation rights.

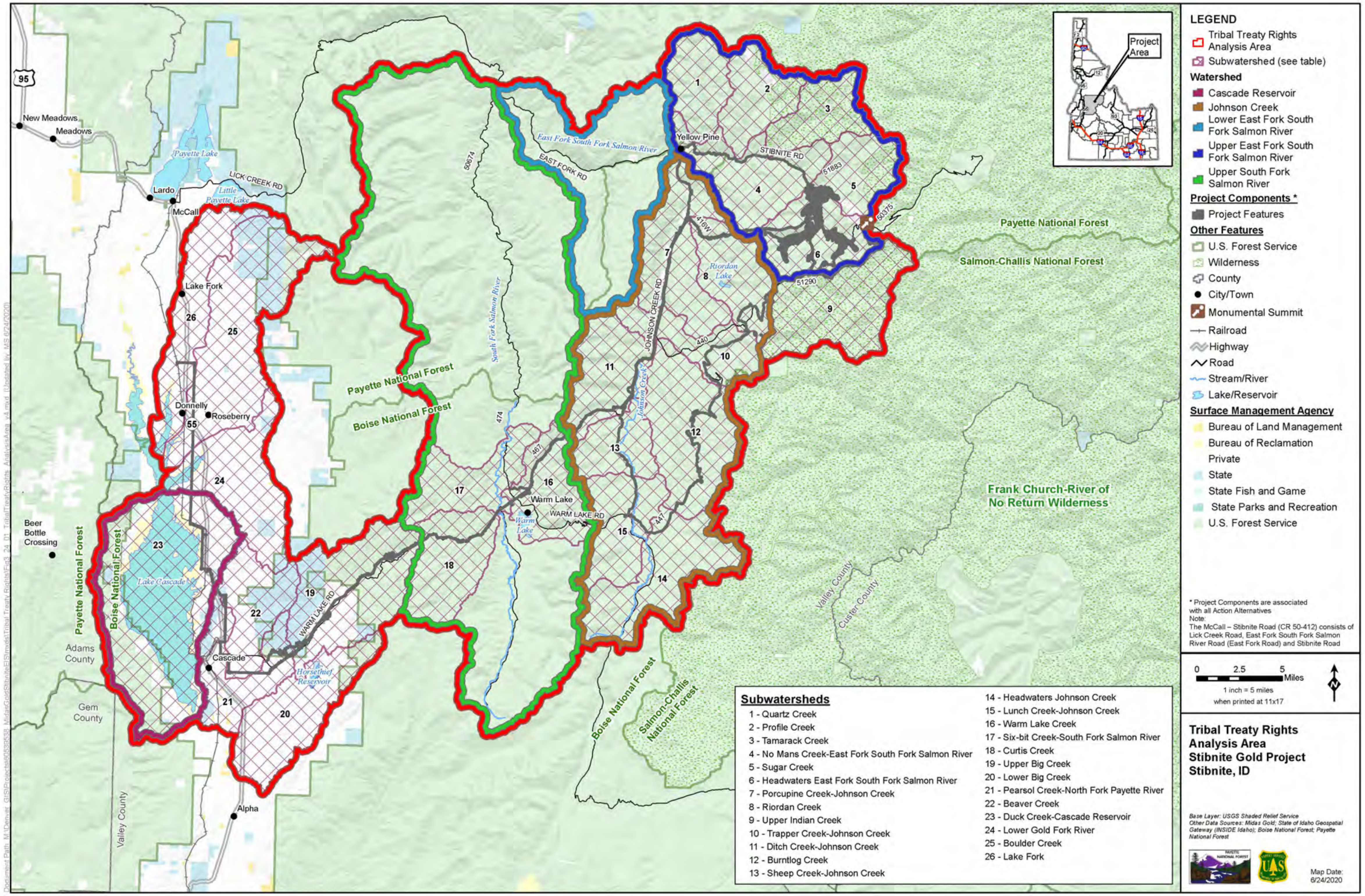

Figure Source: AECOM 2020

Figure-3.24-1 Tribal Rights Analysis Area

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The following excerpts from the treaties with the Nez Perce Tribe and Shoshone-Bannock Tribes, and the EO with the Shoshone-Paiute Tribes characterize the rights that the tribes have and where they can exercise those rights. Certain federal laws that pertain to the exercise of religion at Indian sacred sites also are included in this section. This is followed by a summary of Forest Service directives and plans pertaining to tribal rights.

3.24.2.1 Nez Perce Tribe Treaties (1855 and 1863)

The Nez Perce Tribe Treaty of 1855 established a 7.5-million-acre reservation and reserved rights to fish, hunt, gather, and graze livestock. Article 3 of the treaty identifies the following rights for the Nez Perce Tribe:

> *The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians: as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory, and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land (Nez Perce Tribe Treaty of 1855, Article 3).*

The Nez Perce Tribe Treaty of 1863 does not specifically list any off-reservation rights. However, Article 8 of this treaty secures the same rights as the 1855 treaty:

> *…as set forth in the eighth article of the treaty of June 11, 1855; and further, that all the provisions of said treaty which are not abrogated or specifically changed by any article herein contained, shall remain the same to all intents and purposes as formerly, - the same obligations resting upon the United States, the same privileges continue to the Indians outside of the reservation… (Nez Perce Tribe Treaty of 1863, Article 8).*

3.24.2.2 Shoshone-Bannock Tribes Treaty (1868)

The Fort Bridger Treaty with the Shoshone-Bannock Tribes set aside the Fort Hall Reservation in southeastern Idaho for the Eastern Shoshone, including the Lemhi and the Bannock. It also reserved rights outside of established reservations, including hunting rights:

> *The Indians herein named agree, when the agency house and other buildings shall be constructed on their reservations named, they will make said reservations their permanent home, and they will make no permanent settlement elsewhere; but they shall have the right to hunt on unoccupied lands of the United States so long as game may be found thereon, and so long as peace subsists among the whites and Indians on the borders of the hunting districts* (Fort Bridger Treaty of 1868, Article 4).

Additionally, on June 6, 1900, President McKinley signed the Fort Hall concession of lands (Idaho Centennial Commission Native Americans Committee [ICCNAC] 1992). This concession held up the off-reservation rights of the Fort Bridger Treaty stating, in Article IV of the concession agreement or Act, that:

> *So long as any of the lands ceded, granted, and relinquished under this treaty remain part of the public domain, Indians belonging to the above-mentioned tribes, and living on the reduced reservation, shall have the right, without any charge therefore, to cut timber for their own use, but not for sale, and to pasture their livestock on said public land, and to hunt thereon and to fish in the streams thereof.*

3.24.2.3 Shoshone-Paiute Tribes Executive Order (1877)

The Shoshone-Paiute Tribes EO of 1877 set aside the Duck Valley Reservation for several Western Shoshone bands who traditionally lived along the Owyhee River of southeastern Oregon, in southwestern Idaho, and along the Humboldt River of northeastern Nevada (Thomas et al. 1986). Later, they were joined by Paiute from the lower Weiser country of Idaho and independent Northern Paiutes from the Fort McDermitt, Camp Harney, and Quinn River areas, as well as from the Owyhee region of southwestern Idaho. The aboriginal Northern Paiute territory includes portions of southwestern Idaho, eastern Oregon, and northwestern Nevada. Previous treaties with ancestral Shoshone-Paiute bands, such as the Ruby Valley Treaty of 1863 (ratified), Bruneau Treaty of 1864 (unratified), and Boise Treaty of 1866 (unratified), establish various rights (or do not extinguish rights), which has led to complex unresolved land claims and rights.

3.24.2.4 American Indian Religious Freedom Act (1978)

The American Indian Religious Freedom Act (42 United States Code 1996) promotes federal agency consultation with tribes on activities that may affect their traditional religious rights and cultural practices. These include, but are not limited to, access to sacred sites, freedom to worship through ceremonial and traditional rights, and use and possession of objects considered sacred. These rights and practices may be associated with, and lend significance to, a property. The American Indian Religious Freedom Act directs agencies to consult with Native American traditional religious leaders in a cooperative effort to develop and implement policies and procedures that will aid in determining how to protect and preserve Native American cultural and spiritual traditions.

3.24.2.5 Executive Order 13007 (1996)

EO 13007 requires federal land managing agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. It also requires agencies to develop procedures for reasonable notification of proposed actions or land management policies that may restrict access to or ceremonial use of, or adversely affect, sacred sites.

Sacred sites are defined in EO 13007 as, “any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the Indian tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.”

3.24.2.6 National Forest Land and Resources Management Plans

Forest Service Manual 1563 directs the Forest Service to implement programs and activities consistent with and respecting tribal rights and to fulfill legally mandated trust responsibilities to the extent they are determined applicable to National Forest System lands. Treaty rights and trust responsibilities are defined in Forest Service Manual 1500, Chapter 1560 as:

> *Those rights or interests reserved in treaties for the use and benefit of Tribes. The nature and extent of treaty rights are defined in each treaty. Only Congress may abolish or modify treaties or treaty rights*. *Trust responsibilities arise from the U.S.'s unique legal and political relationship with Indian tribes. It derives from the Federal Government's consistent promise in the treaties that it signed, to protect the safety and well-being of the Indian tribes and tribal members. The federal trust responsibility is a legally enforceable fiduciary obligation on the part of the U.S. to carry out the mandates of federal law with respect to all federally recognized American Indian and Alaska Native tribes and villages* (Forest Service 2016:51).

The Payette National Forest Land and Resource Management Plan (Forest Service 2003a) and the Boise National Forest Land and Resource Management Plan (Forest Service 2010) also provide as part of the desired conditions that:

> *Federal agencies take a more proactive role on the tribes' behalf, especially in areas of treaty interest, rights, traditional and cultural resources, and ecosystem integrity. Federal agencies provide opportunities for traditional American Indian land uses and resources. The presence of healthy habitats is fundamental to the achievement of both useable and harvestable levels of resources significant to American Indians, as well, as to ecosystem integrity (Forest Service 2003a:III-71; Forest Service 2010: III-73).*

Forest Service Manual 1500, Chapter 1560 also summarizes the Forest Service responsibility to protect tribal cultural resources and sacred sites, as codified in legislation, regulations, and other statutory authorities. These apply to sites of historical importance and to sacred sites held sacred because of religious or spiritual importance.

3.24.3 Existing Conditions

The analysis area is in the traditional subsistence range of the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes. Historically, their lifeways were shaped by seasonal travel and resource collection. They spent winter in the warmer lower areas along the river valleys, and summer and early fall higher in the mountains to take advantage of the cooler temperatures and to gather plants, harvest fish, and hunt small and large game animals (Forest Service 2015). This section provides a brief tribal history for each tribe, beginning with the ethnohistoric period around the time of contact, and leading up to contemporary issues and interests.

3.24.3.1 Nez Perce Tribe

The Nez Perce Tribe had one of the largest territories in present day Idaho and a relatively high population density of 5 to 12 persons per 100 square miles (Walker 1982). Their aboriginal territory covered parts of present-day Oregon, Washington, and Idaho. This area included several major river basins: the Columbia, the Salmon, the Snake, and the Clearwater (Indian Claims Commission 1961). The Nez Perce Tribe formed composite bands generally based on familiar ties, language, and territory (ICCNAC 1992; Walker 1982). These bands lived in villages along the riverways and tributaries but traveled seasonally for subsistence. When travel was less frequent in the winter, the Nez Perce Tribe lived in longhouses. Teepees were used during more active traveling seasons such as spring and summer.

This lifeway was disrupted in the early to mid-1800s with the Euroamerican settlers who began moving through and then into Nez Perce territory. Territorial governor Issac Stevens representing the U.S. government negotiated the Nez Perce Treaty of 1855 reserving land for the Nez Perce Tribe, centered in the Lapwai area of northern Idaho. Euroamerican settlers continued to encroach on treaty reserved lands, and when gold was discovered in Orofino, Idaho in the early 1860s, the problem intensified. Another treaty was drafted in 1863 claiming more Nez Perce territory for the U.S. government, which was ratified by the U.S. Congress in 1867. Much of the land claimed was in the Wallowa country of Oregon. This was the home of Chief Joseph’s band who had not been part of the 1863 treaty negotiations. A period of unrest and struggle between Chief Joseph’s band and the settlers followed, leading to the Nez Perce War in the 1870s. By 1877, most of Chief Joseph’s band was forced onto an Oklahoma reservation far from their homeland. A period of government control followed with the goal of assimilating Native Americans into the white population by suppressing native cultures and languages.

Despite this pressure to acculturate, the Nez Perce Tribes was determined to keep their culture and traditions. Additional laws were enacted that further reduced tribal lands, such as the Dawes Act of 1887 that allowed the government to divide communally held lands into individual parcels allowing each tribal member an allotted number of acres to be held in trust in their name for a 25-year period. Any “leftover” land not allotted to a tribal member was sold as surplus to non-native farmers and cattle ranchers. By the 1930s, this practice had debilitated tribal finances and caused the loss of millions of acres of treaty reserved lands (ICCNAC 1992; Nez Perce Tribe 2020).

The Indian Reorganization Act of 1934 was passed to rehabilitate tribal economies and to provide self-government for the tribes. The act ended the allotment practice and allowed the Secretary of the Interior authority to create new reservations for landless tribes and to restore lands not sold to non-Indians to tribal ownership. The Nez Perce Tribe rejected this Act in 1935 by tribal referendum. They had established a nine member Nez Perce Executive Council under a Constitution with By-laws in 1927 and concentrated authority under a 1948 Constitution that was adopted in 1948 and revised in 1961.

The Nez Perce Tribe is self-governing (Forest Service and BLM 1997; ICCNAC 1992; Nez Perce Tribe 2020). The elected Tribal Executive Committee remains the governing body of the Nez Perce Tribe. The goals of the Nez Perce Tribe today are to manage natural resources to meet the demands of modern society while providing cultural protection and economic stimulus (Nez Perce Tribe 2020). The Nez Perce Tribe now manages a wide array of natural resources including timber and salmon fisheries within their 750,000-acre reservation, as well as within off-reservation treaty rights areas (Nez Perce Tribe 2020).

Article 3 of the Nez Perce Tribe Treaty of 1855 affords the Tribe off-reservation rights for fishing, hunting, gathering, and grazing livestock in “all usual and accustomed places” on open and unclaimed land outside the reservation (see Section 3.24.2.1). The analysis area is located within the area claimed to have been exclusively used and occupied by the Nez Perce Tribe, as adjudicated by the Indian Claims Commission (Indian Claims Commission 1961), and within the area in which the Tribe has asserted off-reservation treaty-reserved rights, such as taking fish in usual and accustomed places, hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land, pursuant to language of the Stevens Treaty. Through their ethnographic study, the Tribe has presented historical presence of tribal members and activities in specific areas outside the boundaries of the Nez Perce Reservation. The Nez Perce Tribe continues to be active in fisheries management and habitat restoration along the Salmon River watershed (Nez Perce Tribe 2020).

The SGP is outside of the boundaries of both the Treaty of 1855 and the Treaty of 1863 reservations but within the Nez Perce Tribe’s traditional use area and ceded lands.

3.24.3.2 Shoshone-Bannock Tribes of the Fort Hall Reservation

The Northern or Snake River Shoshone and Bannock occupied an area generally along the Snake River Plain, but their territory also included most of southern Idaho, western Wyoming and Montana, and south into Nevada and Utah (ICCNAC 1992; Murphy and Murphy 1986; Walker 1982). The northern portion of their territory in Idaho included present day Adams and Valley counties. Population densities of this composite group ranged from 1.5 to 2 individuals per 100 square miles (Walker 1982). The Shoshone-Bannock Tribes also traveled in and collected resources throughout central Idaho’s Salmon River Mountains, among other areas (Forest Service 2003a; Murphy and Murphy 1986:286). The four Northern Shoshone Bands divisions included: (1) the Western Shoshone (Waareekas), including the Boise and the Bruneaus; (2) the Mountain Lemhi Shoshone, including the Tukuerukas (Sheepeaters) and the Agaidikas (Salmoneaters); (3) the Northwestern Shoshone, including the Bear Lakes, Cache Valley, Bannock Creek and Weber Ute; and (4) the Pohogue (Fort Hall) Shoshone (Forest Service and BLM 1997).

The Shoshone and the Bannock were two separate tribes with different languages, but these two groups formed into bands of shifting composition and leadership. The Shoshone speakers were the majority, but the chieftainship was sometimes held by a Bannock (Murphy and Murphy 1986). The two intermixed on hunting trips and eventually enough intermarriage occurred that the two tribes became known as the Shoshone-Bannock Tribes. The Shoshone-Bannock Tribes traveled seasonally to collect plants and to hunt. Their camps were sited near water and items were often left at the campsites to share with others who may need them. Important animals and plants for subsistence included salmon, deer, elk, moose, mountain sheep, buffalo, various nuts, seeds, berries and roots such as camas. Small game animals also were used extensively including, groundhog, jack rabbit, porcupines, and prairie dogs (ICCNAC 1992; Walker 1982; Walker 2019). These resources are still important to the Shoshone-Bannock Tribes. Travel was by foot until horses were acquired in the early 1700s. With horses came increased mobility and hunting opportunities. The first contact with Euroamericans was with Lewis and Clark in the early 1800s, and contact was not intensive until Nathaniel Wyeth established the first trading post at Fort Hall, Idaho in 1834. As Fort Hall became a popular spot for explorers, trappers, and settlers on their way to the west coast, thousands of Euroamericans traveled through the Shoshone- Bannock Tribes' territory, causing loss of natural resources of critical importance to the Shoshone-Bannock Tribes (ICCNAC 1992). Fort Hall was later incorporated into the Fort Hall Indian Reservation (Shallat 1995).

The U.S. government negotiated the Fort Bridger Treaty with the Eastern Band of Shoshoni and Bannocks in 1868, with the tribes retaining the right to use all unoccupied land in the U.S. The U.S. government later consolidated the three Bannock bands and the Western Shoshone onto the Fort Hall Reservation. The Bannocks were promised their own reservation in the future, but that reservation was never set aside. The Bannock Tribe has contested the lack of their own reserved lands, which were promised in the 1868 treaty (Forest Service and BLM 1997; ICCNAC 1992).

In the northern part of the territory were the Mountain Lemhi Shoshone who wintered along the Lemhi River, a tributary of the SFSR. The Lemhi depended heavily on salmon runs in the Salmon River system for their subsistence. The central Idaho and western Montana gold discoveries of the 1860s brought thousands of prospectors into Lemhi territory leading to lack of food and other hardships for the Lemhi, who were parties to an unratified treaty in 1868. A small reservation later established on the Lemhi River was inadequate to keep the people fed and in 1907, they succumbed to U.S. government pressure to move to the Fort Hall Reservation. The Mountain Shoshone lived in the mountains of central Idaho. Unlike the Lemhi, this band did not acquire horses until after the Lemhi and other neighboring Shoshone bands. Once they had horses, they became known as the Mountain Sheepeaters and joined with the Mountain Lemhi Shoshone (Forest Service and BLM 1997; Madsen 1999).

The Indian Reorganization Act of 1934 allowed the Shoshone-Bannock Tribes to establish their own system of government operating under a constitution approved in 1936 (ICCNAC 1992; Shoshone-Bannock Tribes 2020). Today the Shoshone-Bannock Tribes are self-governed by the Fort Hall Business Council. This council consists of seven elected tribal members who serve two-year terms, and it maintains authority over all normal business procedures and matters of self-government. Today 97 percent of the 544,000 acres of lands on the Fort Hall Reservation are owned by the Shoshone-Bannock Tribes or by individual tribal members (Forest Service and BLM 1997; Shoshone- Bannock Tribes 2020).

Article 4 of the Fort Bridger Treaty affords off-reservation rights to the Shoshone-Bannock Tribes on “unoccupied lands” of the United States (see Section 3.24.2.2). The Shoshone-Bannock Tribes renew their relationship with “unoccupied lands,” such as the analysis area, and exercise their off-reservation treaty rights by organizing hunting and fishing expeditions in adjoining Western States beyond Idaho (State of Montana 2020). The Shoshone-Bannock Tribes continue to manage fish and wildlife and their habitats in watersheds, including the Salmon River basin, and rehabilitation and hatchery programs are underway to reestablish fish runs decimated by mining, logging, forest fires, irrigation, and overgrazing (Polissar et al. 2016; Shoshone-Bannock Tribes 2020; Walker 1993).

The SGP lies outside of the Fort Hall Reservation but within the Shoshone-Bannock Tribe’s traditional use area.

3.24.3.3 The Shoshone-Paiute Tribes of the Duck Valley Reservation

Ancestral bands of Western Shoshone and Northern Paiute traveled in small groups over a vast territory centered around southern Idaho, northern Nevada, and southeastern Oregon (Fowler and Liljeblad 1986; Thomas et al.1986). Anthropological and historical literature indicate that the Northern Paiute and Northern Shoshone/Bannock groups, in varying degrees of admixture, were the primary aboriginal inhabitants of this region prior to the disturbances associated with contact. The core subsistence areas of the Northern Paiute/Northern Shoshone-Bannock and the Western Shoshone were separated by the high ground dividing the Snake and Humboldt river drainages. Formerly each group travelled throughout different yet overlapping regions.

The Northern Paiute lived in two major bands in territories centering on the upper Snake and Owyhee Rivers, respectively. They used many of the same fishing and camas collection areas as the Shoshone-Bannock Tribes, and their population density was the same as the Shoshone-Bannock Tribes’ at 1.5 to 2 people per 100 square miles; however, groups rarely exceeded 50 individuals (Walker 1982). The arid Paiute territory contained fewer subsistence resources than the Shoshone-Bannock Tribes’ territory, except in the river valleys (Walker 1982). They necessarily relied more on plant foods such as sunflowers, wada seeds, currants, and huckleberries, plus small animals and insects. These traditional resources are still important to the Shoshone-Paiute Tribes. Much time was spent pursuing food based on seasonal cycles. In May they left winter villages to gather roots and prepare salmon traps. At the end of the salmon runs people dispersed to hunt and collect plants and insects. Communal rabbit and antelope drives, and wada seed gathering occurred in early fall. By November, food had been stored and the people returned to the winter villages. Homes were typically conical frame structures with tule mat coverings, but domed earth covered structures were used as well, along with temporary shelters in the summer such as tripodal framed structures and caves (Walker 1982, 2019).

The Western Shoshone were composed of various bands who traveled in small groups over a vast territory centered around southern Idaho and northern Nevada following seasonal routes to procure food. The bands were often named for their principal foods. Camps were shared, and bulkier items would be left in the camps or winter villages for communal use. Both the Western

Shoshone and the Paiute were somewhat isolated by the Rocky Mountains and the Great Basin and did not encounter Euroamericans in their territory until the 1820s, but by the 1840s Euroamericans were traversing Shoshone and Paiute territory to reach the California gold mines. At first relationships were amicable, but conflicts ensued as use of the California Trail increased and the Shoshone-Paiute Tribes' lands were depleted of traditional animal and plant resources (ICCNAC 1992; Shoshone-Paiute Tribes 2020). Travelers using the California Trail urged Congress to provide protection, and the U.S. government responded by sending agents to make treaties with the Shoshone, the Paiute, the Bannock, the Ute, and the Goshute. However, this did not solve the conflict, because the first treaty in 1855 was not ratified by Congress and was never recognized. Frustrated and lacking needed resources, the Western Shoshone and the Paiute fought back, and the U.S. government established military forts at Fort Halleck, Fort Ruby Valley, and Fort McDermitt. In 1863, the Western Shoshone signed the Treaty of Ruby Valley but did not cede lands to the U.S. government as part of this peace treaty.

The creation and subsequent expansions of the Duck Valley Indian Reservation relocated bands of Northern Paiute, Northern Shoshone, and Bannock people. In 1877, the Duck Valley Reservation was set aside by EO for several Western Shoshone bands who traditionally lived along the Owyhee River of southeastern Oregon, in southwestern Idaho, and along the Humboldt River in northeastern Nevada. Later, they were joined by Paiute from the lower Weiser country of Idaho and independent Northern Paiutes from Fort McDermitt, Camp Harney, and Quinn River and from the Owyhee region of southwestern Idaho, who settled on the reservation and took up farming and ranching. The reservation was expanded on the north side by another EO in 1886 to include a Northern Paiute group, Paddy Cap's Band, who arrived in 1884 after being released from the Yakama Reservation (Forest Service and BLM 1997). A third expansion occurred in 1910 (Shoshone-Paiute Tribes 2020).

Today, the Duck Valley Reservation encompasses approximately 294,000 acres. A lack of water on the reservation was an issue for farming, and the need for a dam and reservoir was recognized as early as the 1880s. Requests were ignored by the federal government for many years, and construction of a dam and reservoir was not completed until 1937 as part of the Duck Valley Irrigation Project. The Shoshone-Paiute Tribes are self-governed by a Tribal Business Council made up of seven elected tribal members who serve three-year terms (Forest Service and BLM 1997; Shoshone-Paiute Tribes 2020).

Various ratified and unratified treaties were made with ancestral bands of the Duck Valley Reservation, which have led to currently unresolved land claims and off-reservation rights (McDonald 2009). Many Shoshone-Paiute tribal members today have ancestors in more than one aboriginal group and many are multilingual (Forest Service 2003b). Individuals therefore maintain interests in the territories of more than one group. Management of resources, such as water, fish, and wildlife, are of importance to the Shoshone-Paiute Tribes (Harrison 2015; Shoshone-Paiute Tribes 2020).

The SGP lies outside of the Duck Valley Reservation but within the Shoshone-Paiute Tribe's traditional use area.

3.24.3.4 Tribal Interests

The existing conditions in the context of American Indians refers to the reserved rights tribes have in the analysis area and how these rights are being exercised. Each of the federally recognized tribes with interests in the analysis area bring their own language, traditions, and religion to the area. Since time immemorial, access to and availability of natural resources has been crucial to the survival of American Indians, and these resources still have a major role in the subsistence, culture, religion, and economy of the tribes. Many places were visited during a yearly cycle of seasonal migrations to collect food, medicines, and other materials for sustenance, as well as for religious practices and social gatherings.

The gathering of these resources is still a significant part of the individual cultures of the Nez Perce Tribe, Shoshone-Bannock Tribes, and Shoshone-Paiute Tribes. Tribes maintain an active role in the protection and restoration of various species of plants, wildlife, and fish and their habitats. In National Forest System lands of Idaho, resource use of forest products is tied to personal, traditional, economic, and spiritual purposes, including fishing, particularly for anadromous fish, hunting big game, gathering plants for consumption and for basketry, as well as roots, berries, and harvesting wood products for teepee poles, firewood, and sweat lodges (Forest Service 2003b).

Ethnographic studies undertaken by individual Tribes for the SGP (Nez Perce Tribe [Battaglia 2018]; Shoshone-Bannock Tribes [pending]; Shoshone-Paiute Tribes [Walker 2019]), public scoping comments and documents, and government-to-government consultation between the Forest Service and tribes have identified existing conditions and tribal concerns in the analysis area. The Forest Service is in consultation to determine what information may be disclosed to the public.

There are tribal concerns about the SGP regarding continued access to usual and accustomed places in which tribes exercise their rights and regarding the viability of their tribal resources. Currently, there are no tribal access restrictions on the NFS lands in the SFSR watershed. Tribes access their usual and accustomed fishing places, hunting areas, and plant gathering areas consistent with their reserved rights. Some tribal harvest activities occur along the mainstem SFSR, Secesh River, Lick Creek, Johnson Creek, and the East Fork South Fork Salmon River (EFSFSR) (Nez Perce Tribe 2019). The Nez Perce Tribe expends millions of dollars annually restoring Chinook salmon runs in the East Fork South Fork Salmon River and SFSR through hatchery supplementation, fishery research, and watershed restoration. Imperiled stocks of spring/summer Chinook salmon, steelhead, and bull trout, and designated critical habitat including the upper East Fork South Fork Salmon River up to the Glory Hole at Stibnite, are of particular interest (Nez Perce Tribe 2019).

Many fish, wildlife, and plant species were traditionally utilized by regional tribes and bands of this region for subsistence, ceremonial, medicinal, and other uses (Battaglia 2018; Hunn et al. 1998; Walker 2019). Culturally important species of fish, wildlife, and plants are present in the analysis area, and the Forest Service is continuing to consult with tribes about these tribal resources of concern. Culturally important fish species of interest for the analysis area include

Chinook salmon (*Oncorhynchus tshawytscha*), steelhead trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), Westslope cutthroat trout (*Oncorhynchus clarki lewisi*), mountain whitefish (*Prosopium williamsoni*), and western pearlshell mussel (*Unionida*) (Battaglia 2018, Appendix C).

Culturally important plant species of interest for the analysis area include Huckleberry (*Vaccinium* sp.), Bitterroot (*Lewisia rediviva*), Grouseberry (*Vaccinium scoparium*), Camas (*Camassia quamash*), Chokecherry (*Prunus spp.*), Gooseberry (*R. oxyacantthoides saxosum*), Thimbleberry (*Rubus parviflorus*), Elderberry (*Sambucus racemosa*), Kinnickinick (*Arctostaphylos uva-ursi*), Beargrass (*Xerophyllum tenax*), Dog bane (*Apocynum cannabinum*), Subalpine fir (*Abies lasiocarpa*), Yampah (*Perideridia gairdneri),* whitebark pine (*Pinus albicaulis*), limber pine (*Pinus flexilis*), Lodgepole pine *(Pinus contorta*), bent-flower milkvetch (*Astragalus Vexilliflexus*), Horsetail (*Equisetum* sp.), Pinemoss *(Alectoria* spp.), Lomatia (*Lomatium cous*), Wild Onion (*Allium* spp.), Yarrow (*Achillea millefolium*), Indian Tea (*Rhododendron groenlandicum*), Mariposa Lily (*Calochortus*), Elk Thistle (*Cirsium geyeri*), Penstemon sp., Biscuitroot (*Eriogonum* sp.), Oregon grape (*Mahonia aquifolium*), Syringa (*Philadelphus lewissi*) (Battaglia 2018, Appendix C).

Culturally important wildlife species of interest for the analysis area include North American wolverine (*Gulo gulo*), gray wolf (*Canus lupus*), elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), Black Bear (*Ursus americanus*), and a wide array of waterfowl, upland game birds, small mammals, invertebrates, and other species (Battaglia 2018, Appendix C).

In addition to the tribal use and management of fish, wildlife, and plant resources, there are areas throughout the Payette National Forest and the Boise National Forest that have traditional, cultural, and spiritual significance to the tribes (Battaglia 2018; Walker 2019). The use and protection of these areas by the tribes is a way of maintaining the link between their continuing culture and their ancestors. Areas with more than one type of significance to the tribes often include locations such as hot springs, waterfalls, trails, rock art panels, and traditional collection areas, and the interconnectedness of these resources across the landscape is important. Other landscape features of importance include Riordan Lake and high points, such as mountain tops and ridgelines that are occupied for spiritual practices. This is supported by regional archaeological findings and information received from the Nez Perce Tribe and Shoshone-Paiute Tribes ethnographies that explain that sacred sites are in the analysis area, although exact locations are not public information (Battaglia 2018; Walker 2019).

Specific information regarding the existing conditions of the Vegetation (Section 3.10), Fish Resources and Fish Habitat (Section 3.12), Wildlife and Wildlife Habitat (Section 3.13), and Cultural Resources (Section 3.17) impacts are found in each relevant resource sections of this chapter.